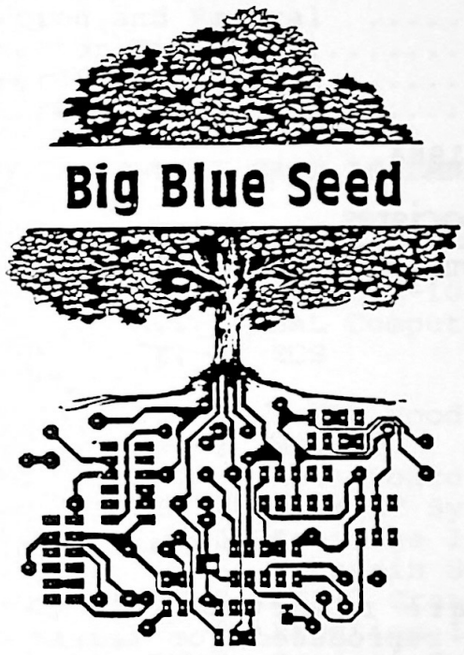
NuScope Associates

Big Blue Seed

THE AUTHORITATIVE GUIDE FOR ASSEMBLING IBM™ COMPATIBLE MOTHERBOARDS AND PERIPHERAL CIRCUIT CARDS WITH PARTS LIST AND COMPONENT LAYOUT

BY
RAYMOND KOSMIC



Other Computer Assembly Manuals by Raymond Kosmic:

APPLE SEED I: Motherboard Assembly Manual
APPLE SEED II: Peripheral Circuit Card Assembly Manual
SURF BOARD: Assembly Guide for the 6502 SURF BOARD

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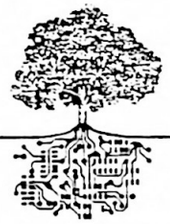

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1 Motherboards	PC-1	JLS OBM-100
	PC-2	HAL Computer
	PC-3	ECS
XT	XT-1	Robin Hood XT
	XT-2	MBE-XT
	XT-3	MEGA-Board
	XT-4	EKBM XT System
	XT-5	Prestige I XT
	XT-6	Fountain Super XT
	XT-7	ECS-7 Grande
	XT-8	Prestige II XT
	XT-9	Perfect-Super XT
XT 640 K	XTE-1	Prelude 640 K
	XTE-2	EK 640 K
	XTE-3	Beltron 640 K
	XTE-4	3D MICRO 640
TURBO	TB-1	College 8 MHz TURBO
AT	ATC-1	Gold Fold AT
	ATC-2	Prelude AT
2 Disk Controller ..	2-1	RHE
	2-2	PG
	2-3	Floppy Disk Adapter
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	2-5	EK
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SECTION	GUIDE	BOARDS & CARDS
3 Memory	3-1	JLS OBM-1 Memory/Serial
	3-2	HAL Memory/Serial
	3-3	Explorer Memory/Serial
	3-4A	512 K RAM
	3-4B	Selectable 512 K RAM
	3-5A	Prelude 384 K Expansion
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	3-6	KRAM
4 Video	4-1	Colour Graphics Display
	4-2	Fountain Monochrome Graphics
	4-3	Colour/Graphics Adapter
	4-4	PG-2 Monochrome Graphics
	4-5	EKBM Monochrome Graphics
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5 Multifunction	5-1	Multifunction
	5-2	Super Disk I/O
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6 Parallel/Serial .. Clock	6-1A	Parallel Printer
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7 Miscellaneous	7-1	EK EPROM Burner & Asynch
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	7-3	Prestige Games Control Adapter
	7-4A	MPY Game Control Adapter
	7-4B	EK Game
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	7-6	Prelude 1200B Modem
8 Prototyping	8-1	Datamax-001
	8-2	Memory Prototype
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	8-4	Extender
	8-5	Perfect Prototype
	8-6	EK Fusible Extender
	8-7	AT Prototype Adapter

PART 1

GUIDELINES TO SUCCESS

SAFETY

When cutting excessive wire leads from resistors, diodes, etc., protect your eyes. Wear safety glasses and keep the card at a reasonably safe distance. Turn your head to the side when trimming component leads.

Treat the soldering iron with respect. A hot iron can inflict a nasty burn. Do not touch the soldered connections before they have cooled down. Always rest the hot iron on a soldering stand when not in use. Turn the soldering iron off when you leave your work area.

Work in a well-ventilated area.

Observe all electrical and fire safety precautions.

There's less chance of an accident if your work area is clean and well organized.

USING THIS GUIDE

Examine the various assembly guides presented in this manual and select the motherboards or peripheral cards that you wish to build. Study the printed circuit board (PCB) in detail before mounting any components. Handle the board ONLY by its edges, NEVER by its surface. Fingerprints may leave a fine film of oil on the solder pads and prevent the solder from making a solid joint. If necessary, clean both sides of the boards with a special commercial cleaner or denatured alcohol (methyl alcohol) before soldering.

Visually inspect the PCB for breaks, shorts, etch-flaws, and irregularities in the lands (tracks). Illuminate the board from the solder side with a strong light. Examine the tracks for shorts and hair-line fractures. Pay special attention to the component side where the tracks will be covered over with sockets. You won't get a second chance to inspect these areas once hidden with components. Check the inner surface of the plate-thru holes; a shiny appearance indicates that they are, in fact, plated-thru. On the other hand, a dull appearance suggests a poorly-made circuit board. If flaws exist, either make the necessary repairs or return the board to the dealer.

Compare the silk-screening on the bare board to the silk-screening on the layout in the text. Record all differences. Check the parts list for availability and price. Mentally position each socket and electrical component and device in place before beginning the actual assembly.

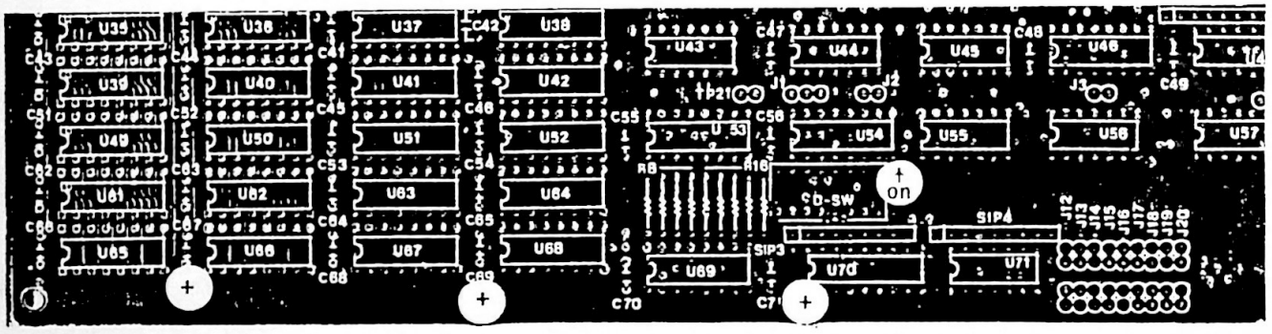
Orientate the board so that the component side faces you. The gold-plated fingers of the peripheral cards should be at the lower right-hand corner.

ALL COMPONENTS ARE MOUNTED ON THE COMPONENT SIDE
AND SOLDERED TO THE SOLDER SIDE

Study the precautions thoroughly (marked with an asterisk * in the guides) before you begin to assemble a circuit board.

Each one of the guides is complete and independent of the others in this manual.

Use the guide as a shopping list. Refer to Fig. 1, A Portion of an Assembly Guide. Check off each component purchased in the space provided on the guide. Circle the appropriate component placement number after it has been installed. Some PCBs have the silk-screened labels printed directly under socket placements making it impossible to know which integrated circuit (IC) to install. If necessary, refer to the component placement layout for IC positioning.



Layout is reduced. Actual si

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

DIODES *Position banded end (cathode) of diodes as shown

cathode end
banded end

____ 2 - IN4148

RESISTORS R ¼ watt, 5%

____ 9 - 22 Ω @ R8,9,10,11,12,13,14,15,16
____ 1 - 100 Ω @ R17
____ 1 - 220 Ω @ R3
____ 1 - 680 Ω @ R5
____ 1 - 1.5 KΩ @ R7
____ 1 - 2.2 KΩ @ R2

RESISTORS (cont)

____ 1 - 1 MΩ @ R6
____ 4 - 4.7 KΩ 9-pin SIP* @ SIP 1,2,3,4
*Match pin 1 of SIPs with pin 1 (square pad) on the layout

SOCKETS *Match pin 1 of sockets with pin 1 (square soder pad) on the layout. Check that ALL pins have passed thru ALL holes

____ 19 - 14-pin
____ 42 - 16-pin
____ 1 - 18-pin

Pin 1

FIG. 1. A PORTION OF AN ASSEMBLY GUIDE.

The correct sequence of installing components is debatable. Try to keep all the components flush against the board. As a general rule, mount the components that are shortest in height first (diodes, resistors, sockets), followed by the taller components (capacitors, switches, resistor networks, etc.). This helps to keep the components tight against the board when soldering.

It may be more convenient, in some situations, to install sockets first. This may eliminate some confusion as to the placement of the smaller components, especially if the card is inadequately silk-screened or cluttered.

Component leads are NEVER inserted into FEED-THRU holes. On some of the boards illustrated, the FEED-THRU holes are smaller and can thus be distinguished from the larger COMPONENT holes.

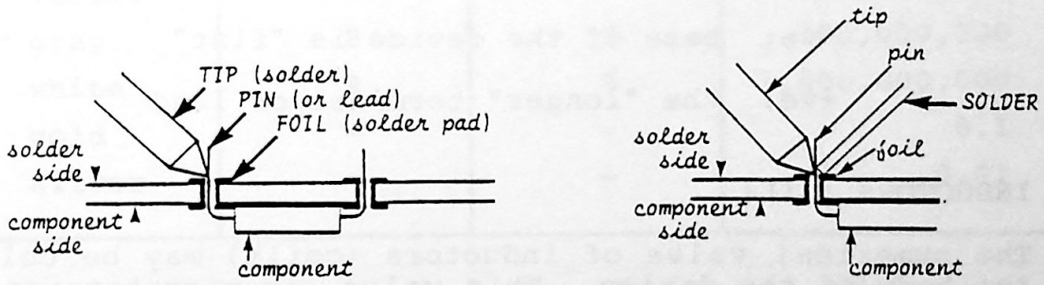
The spacing between two solder holes on any one circuit board is often the same for each type of component. Thus resistor leads are bent to the same length. By-pass capacitors (0.1 uF) have a smaller hole-to-hole spacing. This may help you to decide the mounting position of some of the components.

Use a low-wattage (less than 35 watts) soldering iron with a small pencil, pyramid, or screw-driver tip. Use only rosin-core, radio-type solder with a 60/40 or 63/37 tin/lead content. NEVER use acid-core solder! NEVER use a solder gun!

Take care with your soldering. The soldering iron TIP should make firm contact with the PIN or component lead and the solder PAD as illustrated in FIG. 2. Apply solder to the opposite side of the pin touching both the pin and the pad. Follow this sequence:

IRON ON - SOLDER ON - SOLDER OFF - IRON OFF

Excessive heat may damage delicate components. If done correctly, soldering one pin or component lead should take no more than four to five seconds. More heat may be required on multi-layered boards such as the Colour Graphics Adapter Card, GUIDE 4-3.



A. *Three-Point Contact* B. *Applying the Solder*

FIG. 2. SOLDERING TECHNIQUES.

Some boards are "chip-sensitive" and appear to have a preference for devices made by a specific manufacturer. The parts list shows this source in brackets following the device. Other devices that are followed by a manufacturer's name in brackets are made only by that manufacturer.

Some boards require modifications as illustrated in GUIDE PC-1, JLS OBM-100 Motherboard. Modifications are done on the solder side except where indicated. Study the details thoroughly before attempting any modifications.

GUIDE TO COMPONENTS

For a more detailed look at component identification and placement, and for installation techniques, refer to the "Apple-Seed: Motherboard Assembly Manual, an Introductory Guide," by the same author.

DIODES AND LIGHT EMITTING DIODES (D)

Diodes are delicate and can be easily damaged by rough handling and excess heat. These devices are polarized and must be correctly oriented on the circuit board. Position the banded (cathode) end of the diode towards the tip of the arrow as shown in the following figure.

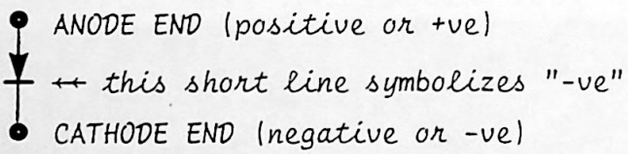


FIG. 3. IDENTIFYING THE CATHODE ON THE LAYOUT.

The polarity of light emitting diodes (LEDs) may be identified in one of the following ways:

-ve: a small "dot" on the body of the device

-ve: base of the device is "flat"

+ve: the "longer" terminal or lead

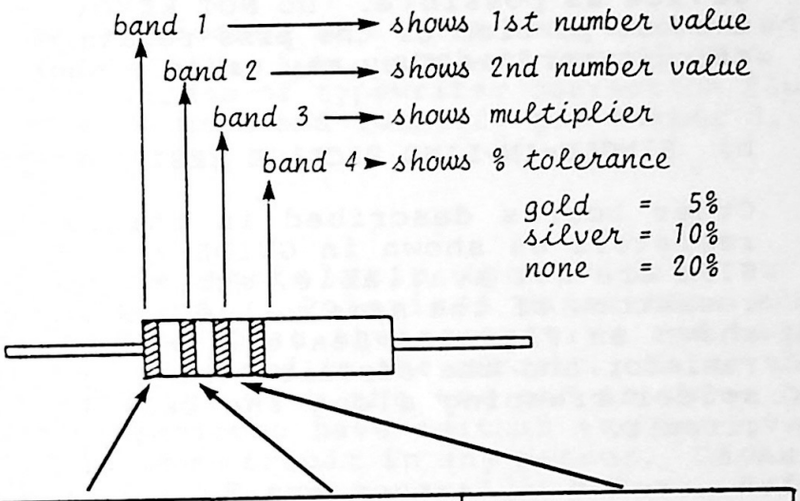
INDUCTORS (L)

The numerical value of inductors (coils) may be colour-coded on the body of the device. This value, in microhenries (uH), can be determined using Table 1 Resistor Colour Code Chart.

RESISTORS (R)

The resistors used to assemble the majority of boards and cards illustrated in this manual are 1/4 watt, with a tolerance of 5 percent (%). Refer to the following table, Resistor Colour Code Chart, to determine the ohms value of resistors.

Table I. Resistor Colour Code Chart.



colour	1st digit	2nd digit	multiplier
black	0	0	1
brown	1	1	10
red	2	2	100
orange	3	3	1,000
yellow	4	4	10,000
green	5	5	100,000
blue	6	6	1,000,000
violet	7	7	10,000,000
gray	8	8	100,000,000
white	9	9	1,000,000,000
gold	-	-	0.1
silver	-	-	0.01

Examples: a) *yellow - violet - black refers to*
4 7 x1 = 47 Ω *resistor*

b) *brown - green - red refers to*
1 5 x100 = 1,500 Ω *or* 1.5 kΩ *resistor*

a) SINGLE-IN-LINE PACKAGE (SIP) RESISTOR NETWORKS (RN) - BUSSED

The majority of SIP RNs used in this manual are bussed. Pin 1 of SIPs is common and must be correctly positioned in the circuit. Pin 1 of the device may be identified by a "dot", a "bar", or a number.

A bussed SIP resistor with the correct number of pins may not always be available. Purchase one with more pins than required and cut off the extra number of pins as close to the body of the device as possible. Do NOT REMOVE pin number 1. Do NOT allow the cut portion of the pins remaining on the device to touch the circuit card as they may cause a short circuit.

b) SINGLE-IN-LINE PACKAGE RESISTOR NETWORKS (RN) - ISOLATED

Other boards described in this manual require isolated SIP resistors as shown in GUIDE 3-4, 512 K RAM Card. If isolated SIPs are not available, substitute the same number of single resistors of the same value. Stand the resistor on its end as shown in Fig. 4. Leave a small gap between the end of the resistor and the circuit card to prevent "solder wicking", i.e., solder creeping along the card and possibly causing a short circuit.

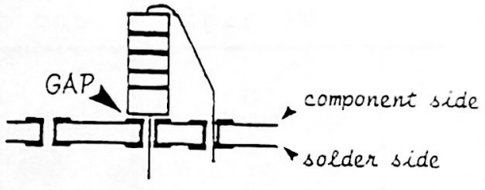


FIG. 4. INSTALLING A RESISTOR ON ITS END.

c) DUAL-IN-LINE PACKAGE (DIP) RESISTOR NETWORKS

Some boards require DIP resistor networks. These should be soldered to the board. If DIP resistors are not available, substitute the appropriate number of single resistors of the same value. Solder these flat against the board or stand them upright depending on the resistance configuration (isolated or bussed).

SOCKETS

It is strongly recommended that ALL integrated circuits be socketed. One of the best forms of trouble-shooting is "chip-swapping". Use high-quality dual-in-line package (DIP) solder-tail IC sockets.

CHECK AND RECHECK THAT

- -pin 1 of each socket is properly oriented on the card
- -each socket is installed in the correct position, i.e., a 14-pin socket is not mounted in a 16-pin opening
- -ALL socket pins have passed thru ALL holes, i.e., no folded-under or folded-out pins
- -each socket is flat against the card.

Do NOT attempt to remove a socket if it has been installed with pin 1 positioned incorrectly, i.e., socket turned thru 180^0. Instead, apply a very small dab of typewriter correction fluid to the corner of the socket to mark and identify pin number 1.

CAPACITORS (C)

Capacitors are either electrolytic (polarized) or non-electrolytic (non-polarized). Polarized capacitors must be connected in the circuit so that their positive and negative terminals are correctly positioned in the circuit. Match the +ve terminal of these capacitors with the +ve end as shown on the layout. Non-polarized capacitors have neither +ve nor -ve ends and may be positioned in the circuit in any manner. Capacitors of values greater than 0.1 uF are generally polar. Refer to Table II to determine the value and tolerance of capacitors.

Table II. Multiplier and Tolerance Chart for Capacitors.

MULTIPLIER		TOLERANCE		
for the number:	multiply by:	10 pF or less	letter	over 10 pF
0	1	± 0.1 pF	B	-
1	10	± 0.25 pF	C	-
2	100	± 0.5 pF	D	-
3	1,000	± 1.0 pF	F	± 1%
4	10,000	± 2.0 pF	G	± 2%
5	100,000	-	H	± 3%
-	-	-	J	± 5%
8	0.01	-	K	± 10%
9	0.1	-	M	± 20%

Voltage ratings, usually printed on the component, show how much voltage can safely be used without damaging the capacitor. The rating must be higher than the highest voltage in the circuit.

Install variable capacitors (trimmers or trimcaps) so that the common terminals of the device are aligned with the common solder pads on the card.

TRANSISTORS (Q)

Handle transistors with care. Protect them from mechanical injury. Use minimum heat when soldering. Transistors may be destroyed if their three leads are incorrectly positioned in the circuit. Identifying the emitter, collector, and base (EBC) terminals however, presents a problem; the body of the device may or may not be labelled; the circuit board may or may not be silk-screened; different manufacturers arrange the EBC leads differently. If in doubt, check with your dealer.

CRYSTALS AND OSCILLATORS (Y)

Crystals are delicate. A severe jolt may chip the crystal suspended in the metal case. Install crystals last to prevent excessive movement while working on other components. Fold the body of the device flat against the card before soldering if space is available on the card. Secure the crystal to the card with double-sided tape. Alternately, some boards have feed-thru holes or "grounding pads" at each side of the crystal so that the device can be soldered in place. Wrap a thin bare wire around the device, install the ends of the wire into the grounding pads, and solder. Use a minimum amount of heat to solder the wire to the case.

INTEGRATED CIRCUITS (IC)

Treat ICs with care. Handle them by the body, not the pins. Protect them from mechanical injury.

The power must be OFF when inserting or removing ICs or other devices. Excessive voltage, reversed polarity, short circuits, etc., can quickly destroy an IC. ICs must be correctly positioned in the circuit. Pin 1 of ICs can be identified by a "dot", a "triangle", a "1", a "notch", etc. Match pin 1 of ICs with pin 1 on the layout.

Metal-Oxide-Silicon (MOS) and Complementary Metal-Oxide-Silicon (CMOS) integrated circuits are very sensitive to static electrical discharge, and require special handling. Store them in their original shipping tubes or with their pins embedded in special conductive foam. Linear ICs are moderately sensitive, whereas Transistor-Transistor Logic (TTL) ICs are relatively insensitive to static discharge.

Firmware, software written into PROMs (Programmable Read-Only Memory), EPROMs (Erasable ROM), EEPROMs (Electrical EPROM), and PALs (Programmed Array Logic), is the responsibility of the builder and can be programmed according to the requirements of the individual. These devices are sensitive to static discharge.

Keep EPROMs away from direct sunlight. Ultraviolet (UV) radiation of sunlight may partially erase some of the information programmed in an EPROM. Protect them by applying a non-transparent piece of tape or label over the transparent window on top of the device.

Some boards are "chip sensitive" - i.e. they require ICs made by a specific manufacturer. They will not run unless the correct combination of chips are installed. This involves "chip-swapping" using ICs from different manufacturers.

CARD INSTALLATION AND REMOVAL

CARD INSTALLATION

Turn the POWER OFF before installing or removing devices, peripheral cards or hardware, or when changing switch settings. Failure to so so will likely result in circuit damage to the card, other cards, and the motherboard.

Discharge STATIC ELECTRICITY in your body by touching the metal case of the power supply.

Orientate the peripheral card so that the COMPONENT SIDE faces the power supply. Position the card carefully in the slot so that no "sliding" FRONT-TO-BACK movement occurs. This abrasive movement may strip the thin gold layer from the fingers of the card. On the other hand, if a card runs intermittently, try cleaning the gold contacts by gently rubbing them with a soft eraser.

Insert the fingers of the card into the appropriate edge connector. Rock the card from FRONT-TO-BACK while gently applying downward pressure. Refer to Fig. 5 for the front-to-back orientation. The card must be firmly seated in the slot before turning on the power.

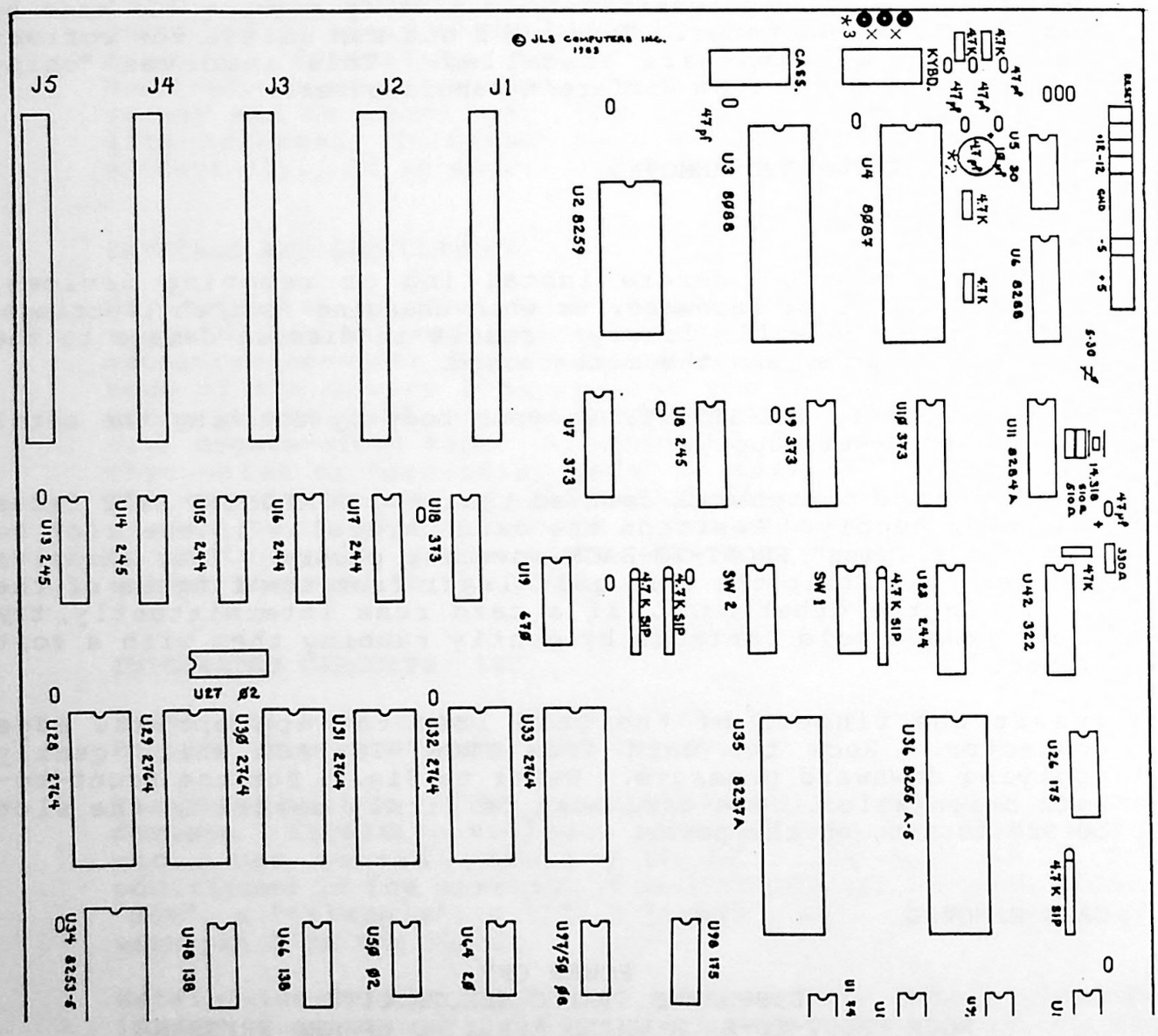
CARD REMOVAL

POWER OFF
DISCHARGE STATIC ELECTRICITY
ROCK FRONT-TO-BACK WHILE APPLYING UPWARD PRESSURE

PRECAUTIONS

- Do NOT rock the card from side-to-side.
- Do NOT touch the gold-plated contact fingers of the card.
- Do NOT unnecessarily install and remove cards. Some poor quality card-edge connectors may break down, creating poor or non-existent contacts.
- Do NOT apply excessive force: you may flex the motherboard sufficiently to break one or more of the tracks.

TO BACK OF COMPUTER



TO FRONT OF COMPUTER

FIG. 5. A PORTION OF THE TOP VIEW OF THE MOTHERBOARD SHOWING FRONT-TO-BACK ORIENTATION AND LOCATION OF THE POWER SUPPLY.

CARD AND CONNECTOR PINOUT

Refer to Fig. 6 for the edge connector and peripheral card pinouts. The reproductions are close to original size. To quickly identify any one of the pins or contacts, lay the card along the edge of the centre diagram and directly read off the pin number. Do NOT mistakenly interchange the component side with the solder side. Note that the relative position of the power supply is normally to the right of the motherboard.

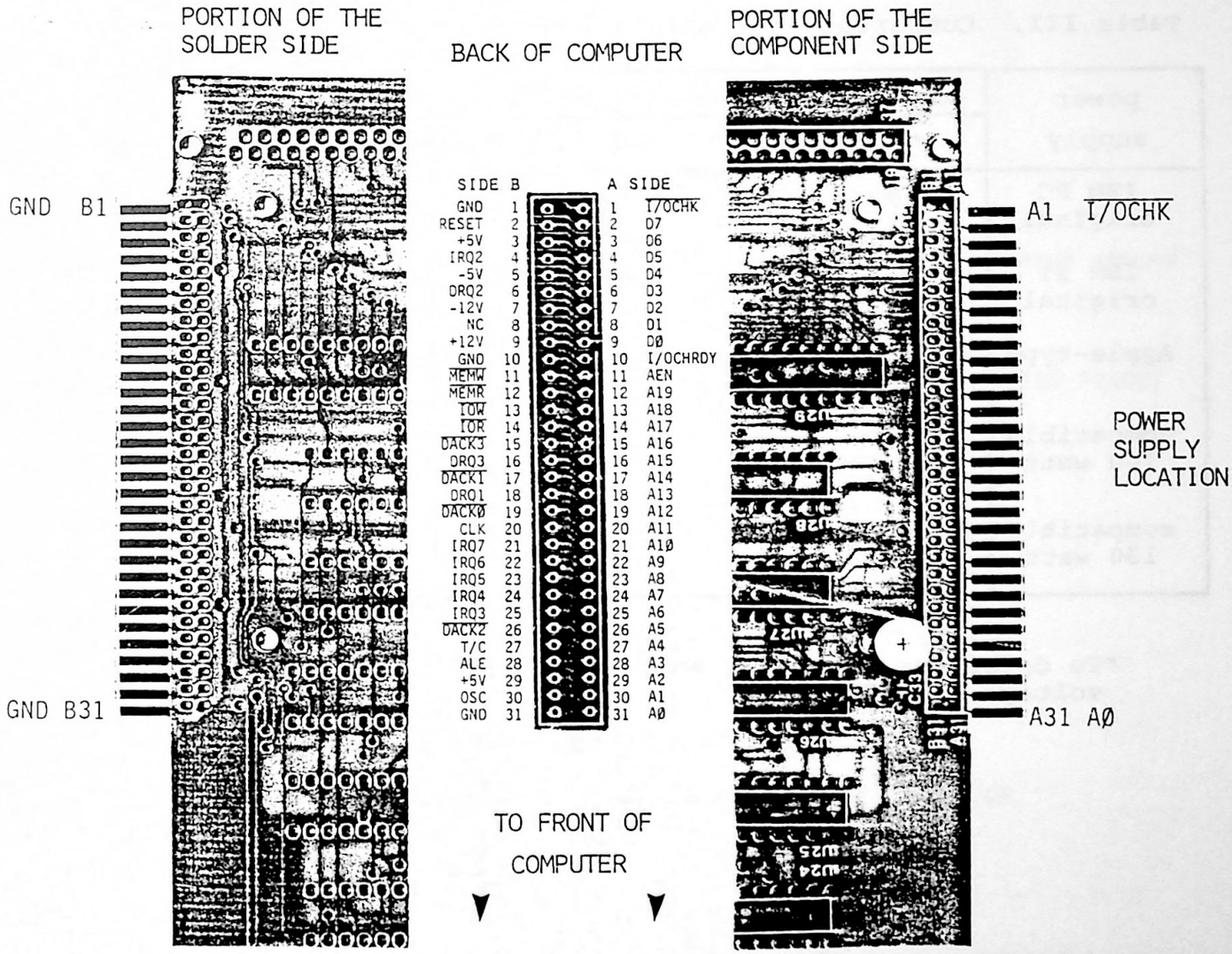


FIG. 6. CARD AND CONNECTOR PINOUT.

SYSTEM UNIT HARDWARE

POWER SUPPLY

A switching-type power supply provides power to the system motherboard, peripheral cards, disk drives, and keyboard. Select one with sufficient reserve power to handle all present and future options. Memory and disk drives are the major current users. Refer to Table III for a comparison of various units.

Table III. Comparison of Various Power Supplies (current in amperes)

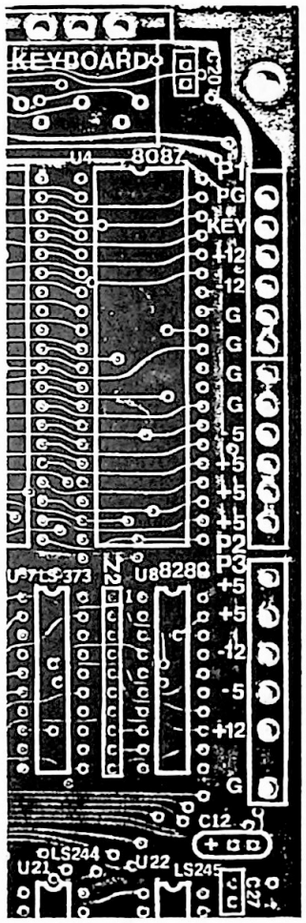
power supply	potential difference (volts DC)				power (watts)	power for
	+5	+12	-12	-5		
IBM PC original	7.0	2.0	0.25	0.3	63.5	basic system
IBM XT original	15	4.2	0.25	0.3	129.9	all peripherals including hard drive
Apple-type	7	3	1	1	88.0*	basic system
compatible 100 watt	10	3.5	0.5	0.5	100.5	all peripherals plus lo-power slim-line hard disk drive
compatible 130 watt	15	4.5	0.5	0.5	137.5	all peripherals including hard drive

*To determine the total power, multiply the current times the voltage and add:

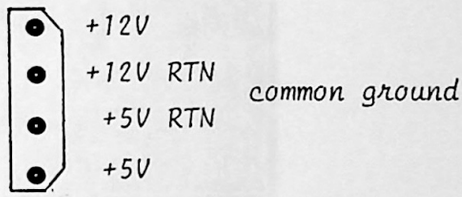
amperes	x volts	= watts
7	+5	35.0
3	+12	36.0
1	-12	12.0
1	-5	5.0
		88.0 watts

The power supply is connected to the motherboard by means of a 12-pin Molex-type connector. Some motherboards illustrated in this manual, e.g. GUIDE XT-2, MBE motherboard, have an optional "P3" connector for use with the popular Apple-type power supply.

Usually two 4-pin drive connectors are available to supply power to a pair of 5 1/4" floppy disk drives. A third drive connector, found on the 130 watt power supply, is used to power a hard disk drive. Some power supplies have four disk drive connectors. The following figure illustrates the pinouts for the power to the motherboard and disk drive.



A. MOTHERBOARD POWER SUPPLY PINOUT



B. DISK DRIVE CONNECTOR PINOUT

FIG. 7. PINOUTS FOR A. MOTHERBOARD AND B. DISK DRIVE CONNECTOR.

CASE

Purchase a case and power supply together as a matched pair. Check that the cutouts in the case align with the switch, power cord connector, AC outlet, and fan vent of the power supply.

Select a case with slot spacings that match those on the motherboard. PC-compatible cases normally have five slots with a slot spacing of 25 mm. On the other hand, XT-compatible cases have eight slots with a slot spacing of 20 mm. Furthermore, rear panel adapters differ in width: a PC adapter is 25 mm, whereas an XT adapter is 18 mm wide.

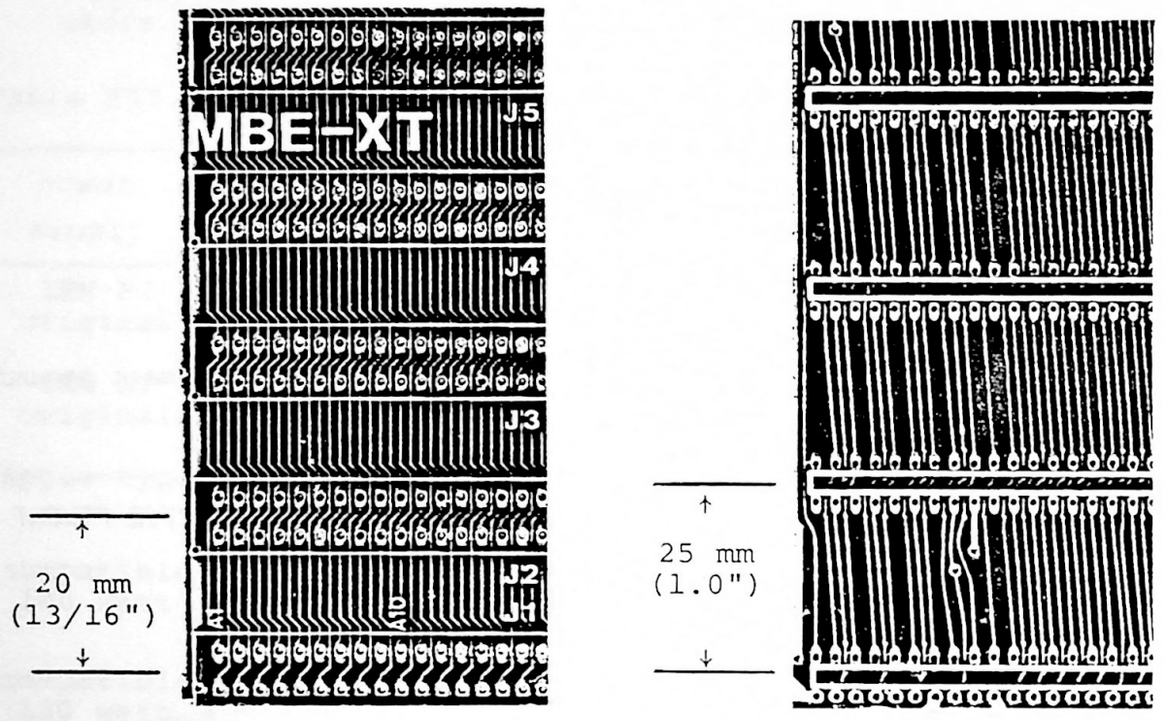


FIG. 8. XT AND PC MOTHERBOARD SLOT SPACING (center-to-center)

FAN

The power supply should have a built-in fan to circulate air and prevent overheating. Replace the fan with a more powerfull one if the surface of the case becomes too hot, especially when using a hard disk drive. Install a fan in the case when using the Apple-type power supply.

Orient the fan so that hot air is drawn from the top of the case and exhausted out the rear or out the bottom when using the Apple-type power supply.

APPENDIX

ABBREVIATIONS

Alt	- Alternate
B	- Base (Transistor)
BIT	- Binary digIT
BYTE	- a group of 8 BITs
C	- Collector (Transistor)
C	- letter code for Capacitor
CharGen	- Character Generator
CMOS	- Complementary Metal-Oxide-Silicon
Cont	- Controller
CP/M	- Control Program for Microprocessors
CPU	- Central Processing Unit
CRT	- Cathode Ray Tube
D	- letter code for Diode
DIN	- European type connector
DIP	- Dual In-line Package
D.C.	- Direct Current
DOS	- Disk Operating System
DRAM	- Dynamic RAM
DPDT	- Double-Pole, Double-Throw
DUART	- Dual Asynchronous Receiver Transmitter
E	- Emitter (Transistor)
EPROM	- Erasable PROM
FDC	- Floppy Disk Controller
FET	- Field Effect Transistor
GND	- Ground
HIRES	- High Resolution
Hz	- Hertz
IC	- Integrated Circuit
IEEE	- Institute of Electrical and Electronic Engineers
I/O	- Input/Output
J	- Jumper
K	- Kilobyte, 1,024 bytes
L	- letter code for Coil or Inductor
LED	- Light Emitting Diode
LPT	- Line PrinTer
M	- Megabyte, 1,024,000 bytes
MOS	- Metal-Oxide-Silicon
MPU	- Microprocessing Unit
-ve	- negative
NiCad	- Nickel Cadmium
ns	- nano second
+ve	- positive
P	- post
PAL	- Programmed Aray Logic
PC	- Printed Circuit
PCB	- Printed Circuit Board
PG	- Power Good
PROM	- Programmable ROM

Q	- letter code for Transistor
R	- letter code for Resistor
R	- Ring
RAM	- Random-Access Memory
RF	- Radio Frequency
RGB	- Red, Green, Blue
RN	- Resistor Network
ROM	- Read-Only Memory
RTN	- Return
S	- Schottky
S, SW	- Switch
S,SPKR	- Speaker
SIP	- Single In-line Package
SPDP	- Single-Pole, Double-Throw
TP	- Terminal Post
Trimcap	- Trim capacitor
Trimpot	- Trim potentiometer
TTL	- Transistor-Transistor Logic
UV	- Ultra Violet
V	- Volt
Vid	- Video
VR	- Variable Resistor
XTAL	- Crystal
XTL	- Crystal
Y	- letter code for Crystal
ZIF	- Zero Insertion Socket

METRIC PREFIXES Decimal points and large numbers are avoided.

p	pico	10^{-12}
n	nano	10^{-9}
	micro	10^{-6}
m	milli	10^{-3}
-	-	10^{0}
k	kilo	10^{3}
M	mega	10^{6}
G	giga	10^{9}

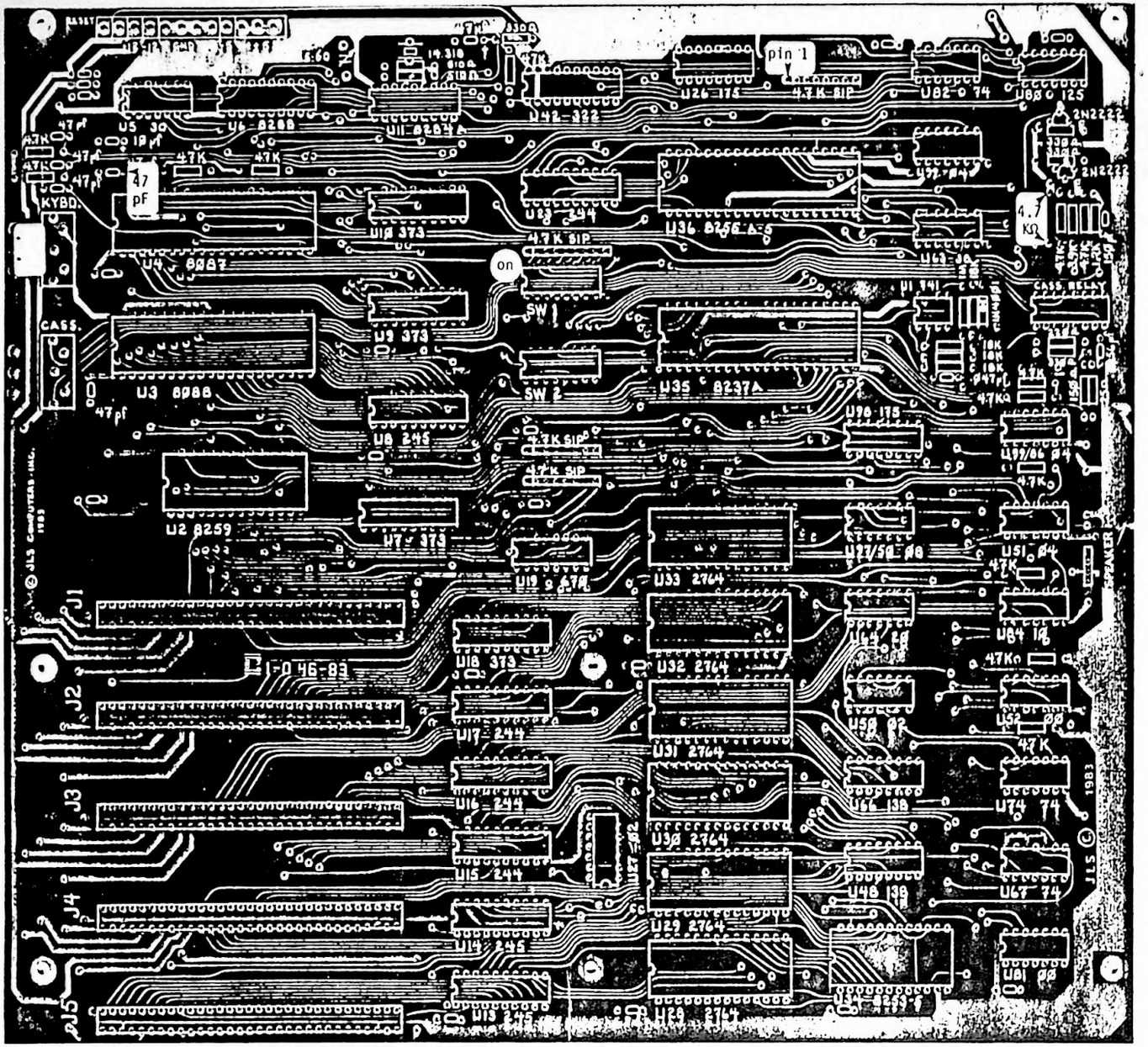
PART II

MOTHERBOARD AND PERIPHERAL CARD ASSEMBLY GUIDES

Study PART I, GUIDELINES TO SUCCESS, before attempting to assemble any of the following bare cards or boards.

GUIDE PC-1

JLS OBM-100 MOTHERBOARD: Features include: 8088 MPU with socket for optional 8087 co-processor; five I/O expansion slots, PC spacing of 25 mm; no on-board memory; six ROM sockets; cassette port available; schematics available from supplier.



JLS OBM-100 MOTHERBOARD (continued):

SUGGESTED SEQUENCE *INDICATES A PRECAUTION *MODIFICATION REQUIRED

DIODES D *Position banded (cathode) end of diode as shown

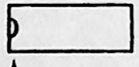
____ 1 - 1N4001 cathode end

RESISTORS R ¼ watt, 5%

____ 1 - 150 Ω
____ 1 - 220 Ω
____ 4 - 330 Ω
____ 2 - 510 Ω
____ 1 - 1.2 KΩ
____ 1 - 3.9 KΩ
____13 - 4.7 KΩ *Install a 4.7 K resistor as shown on the layout
____ 4 - 18 KΩ
____ 1 - 47 KΩ
____ 1 - 1 MΩ
____ 3 - 4.7 KΩ 8-pin SIP*
____ 1 - 4.7 KΩ 9-pin SIP*
*Match pin 1 of SIPs as shown on the layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 1 - 8-pin
____16 - 14-pin
____ 6 - 16-pin
____ 1 - 18-pin
____13 - 20-pin
____ 1 - 24-pin
____ 7 - 28-pin
____ 4 - 40-pin



CAPACITORS C

____ 5 - 47 pF ____ 1 - 56 pF
____ 1 - 150 pF
____ 1 - 0.047 µF
____21 - 0.1 µF Monolithic @ O
____ 1 - 5-50 pF Trimcap @ 5-60
*Match + of the following capacitors with + on the layout
____ 1 - 10 µF/16V Tantalum*
____ 1 - 47 µF/16V Tantalum*

TRANSISTORS *Position EBC terminals as shown on the layout

____ 2 - 2N2222

CRYSTAL Y *Fold crystal flat against the board before soldering

____ 1 - 14.31818 MHz

SWITCH

____ 2 - 8-position DIP @ SW 1,2

CONNECTORS *Cassette connector optional

____ 1 - 12-pin male, straight (Molex) for power
____ 1 - 1x4 header, male, 90° for speaker
____ 1 - 5-pin DIN, for keyboard
*Drill two small holes @ locations marked • to support the connector
____ 5 - 62-pin edge card connectors

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 2 - 74LS00 @ U52,81
____ 2 - 74LS02 @ U27,50
____ 3 - 74LS04 @ U51,99,99/86
____ 1 - 74LS08 @ U97/50
____ 1 - 74LS10 @ U84
____ 1 - 74LS20 @ U64
____ 1 - 74LS30 @ U5
____ 1 - 74LS38 @ U63
____ 3 - 74LS74 @ U67,74,82
____ 1 - 74LS125 @ U80
____ 2 - 74LS138 @ U48,66
____ 2 - 74LS175 @ U26,98
____ 4 - 74LS244 @ U15,16,17,23
____ 3 - 74LS245 @ U8,13,14
____ 1 - 74LS322 @ U42
____ 4 - 74LS373 @ U7,9,10,18
____ 1 - 74LS670 @ U19

INTEGRATED CIRCUITS (continued)

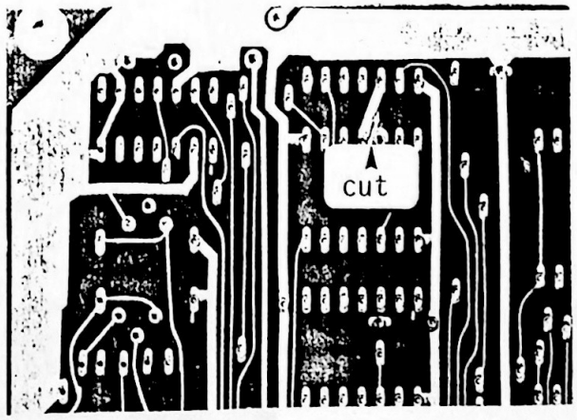
____ 1 - LM741 @ U1

____ 1 - 8088 MPU @ U3
____ 1 - 8237A-5 @ U35
____ 1 - 8253-5 @ U34
____ 1 - 8255A-5 @ U36
____ 1 - 8259A @ U2
____ 1 - 8284A @ U11
____ 1 - 8288 @ U6

____ 1 - 2764 Boot EPROM @ U33

MODIFICATIONS *ON THE SOLDER SIDE

____ 1 - Cut trace between pin 3 & 4 of U82 (74LS74) on the SOLDER SIDE (if required)



JLS OBM-100 MOTHERBOARD (continued):

SWITCH # 1 SETTINGS:

POSITION 2: remains off - reserved for the co-processor

POSITIONS 3 & 4: remain off - indicate a minimum configuration of 64K bytes

POSITIONS 5 & 6: define video board type as follows:

video board type	settings 5	6
colour (40x25)	off	on
colour (80x25)	on	off
black/white or both	off	off
none	on	on

POSITIONS 1, 7 & 8: define the number of floppy disc drives in use:

number of drives	settings 1	7	8
0	on	on	on
1	off	on	on
2	off	off	on
3	off	on	off
4	off	off	off

SWITCH # 2 SETTINGS:

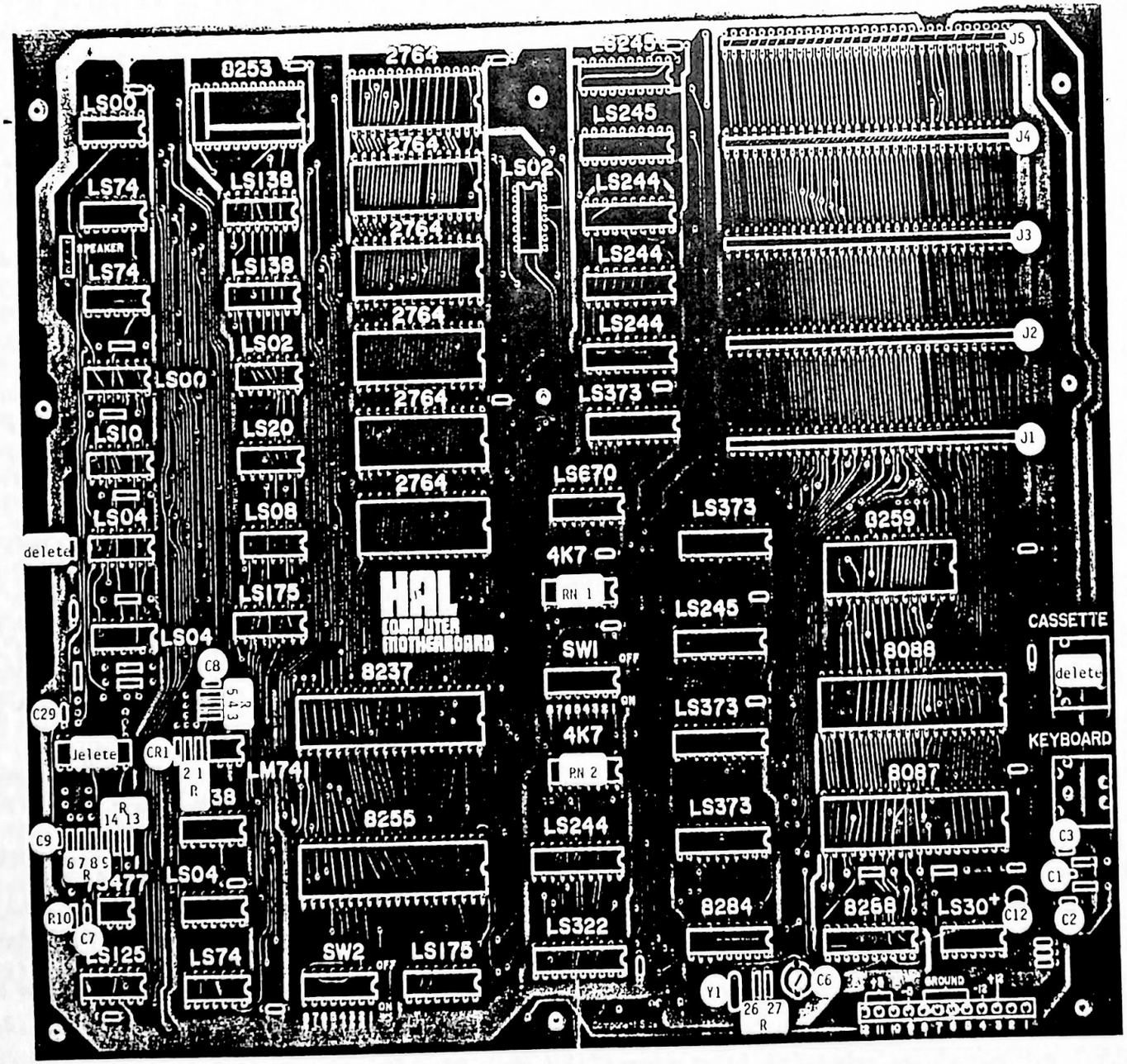
POSITIONS 5, 6, 7 & 8: always remain off

SET # 5 to on when using a hard disk drive

POSITIONS 1, 2, 3 & 4: qualify memory as follows:

memory	settings 1	2	3	4
64K	on	on	on	on
128K	on	off	on	on
192K	on	on	off	on
256K	on	off	off	on

HAL COMPUTER MOTHERBOARD: Features include: 8088 MPU with socket for optional 8087 co-processor; five I/O expansion slots, PC spacing of 25 mm; no on-board memory; six ROM sockets; cassette port available; documentaion and schematics available from supplier.



actual size
29.4 cm x 26.3 cm
(layout is reduced)

NuScope Associates

HAL COMPUTER MOTHERBOARD (continued)

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

DIODES D *Position banded (cathode) end of diode as shown

____ 1 - 1N4001

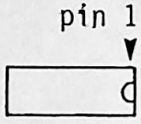
cathode end

RESISTORS R ¼ watt, 5%

____ 1 - 47 Ω @ R10
____ 2 - 150 Ω @ R6,25
____ 3 - 1.2 KΩ @ R7,26,27
____ 1 - 3.9 KΩ @ R9
____ 13 - 4.7 KΩ @ positions ●□●
____ 4 - 18 KΩ @ R1,3,4,5
____ 1 - 1 MΩ @ R2
____ 2 - 4.7 KΩ 16-pin DIP @ RN1,2
*Solder DIPs to the board

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 2 - 8-pin
____ 14 - 14-pin
____ 8 - 16-pin
____ 1 - 18-pin
____ 13 - 20-pin
____ 1 - 24-pin
____ 7 - 28-pin
____ 4 - 40-pin



CAPACITORS C

____ 4 - 56 pF @ C1,2,3,29
____ 2 - 0.01 µF @ C7,9
____ 1 - 0.047 µF @ C8
____ 22 - 0.1 µF Monolithic @ ●⊂●
____ 1 - 5-60 pF Trimcap @ C6
____ 1 - 10 µF/16V Axial* @ C12
*Match + of Axial with + on the layout

CRYSTAL Y *Fold crystal flat against the board before soldering

____ 1 - 14.31818 MHz

SWITCH

____ 2 - 8-position DIP

CONNECTORS

____ 1 - 12-pin male, straight, (Molex) for power
____ 1 - 1x4 header, male, 90° for speaker (pins 1&4)
____ 1 - 5-pin DIP for keyboard
____ 5 - 62-pin card edge connectors

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 2 - 74LS00
____ 2 - 74LS02
____ 3 - 74LS04
____ 1 - 74LS08
____ 1 - 74LS10
____ 1 - 74LS20
____ 1 - 74LS30
____ 1 - 74LS38
____ 3 - 74LS74
____ 1 - 74LS125
____ 2 - 74LS138
____ 2 - 74LS175
____ 4 - 74LS244
____ 3 - 74LS245
____ 1 - 74LS322
____ 4 - 74LS373
____ 1 - 74LS670

____ 1 - LM741
____ 1 - 75477

INTEGRATED CIRCUITS (continued)

____ 1 - 8087 (optional)
____ 1 - 8088 MPU
____ 1 - 8237A-5
____ 1 - 8253-5
____ 1 - 8255A-5
____ 1 - 8259A
____ 1 - 8284A
____ 1 - 8288

____ 1 - 2764 Boot EPROM @ U26
____ 5 - 2764 EPROMs @ U21,22,23, U24,25 (optioal)

SWITCH SETTINGS - MOTHERBOARD SWITCH 1

SW1 positions 1, 7 and 8 are set to indicate the number of floppy disks:

Number of Drives	Switch Positions 1	7	8
0	ON	ON	ON
1	OFF	ON	ON
2	OFF	OFF	ON
3	OFF	ON	OFF
4	OFF	OFF	OFF

SW1 position 2 is always ON and SW1 positions 3 and 4 are always OFF.

SW1 positions 5 and 6 are set to the type of monitor in use:

Monitor Type	Switch Positions 5	6
None	ON	ON
Color (40 by 25)	OFF	ON
Color (80 by 25)	ON	OFF
Black and White (or both)	OFF	OFF

SWITCH SETTINGS - MOTHERBOARD SWITCH 2

SW2 position 1 is always set ON.

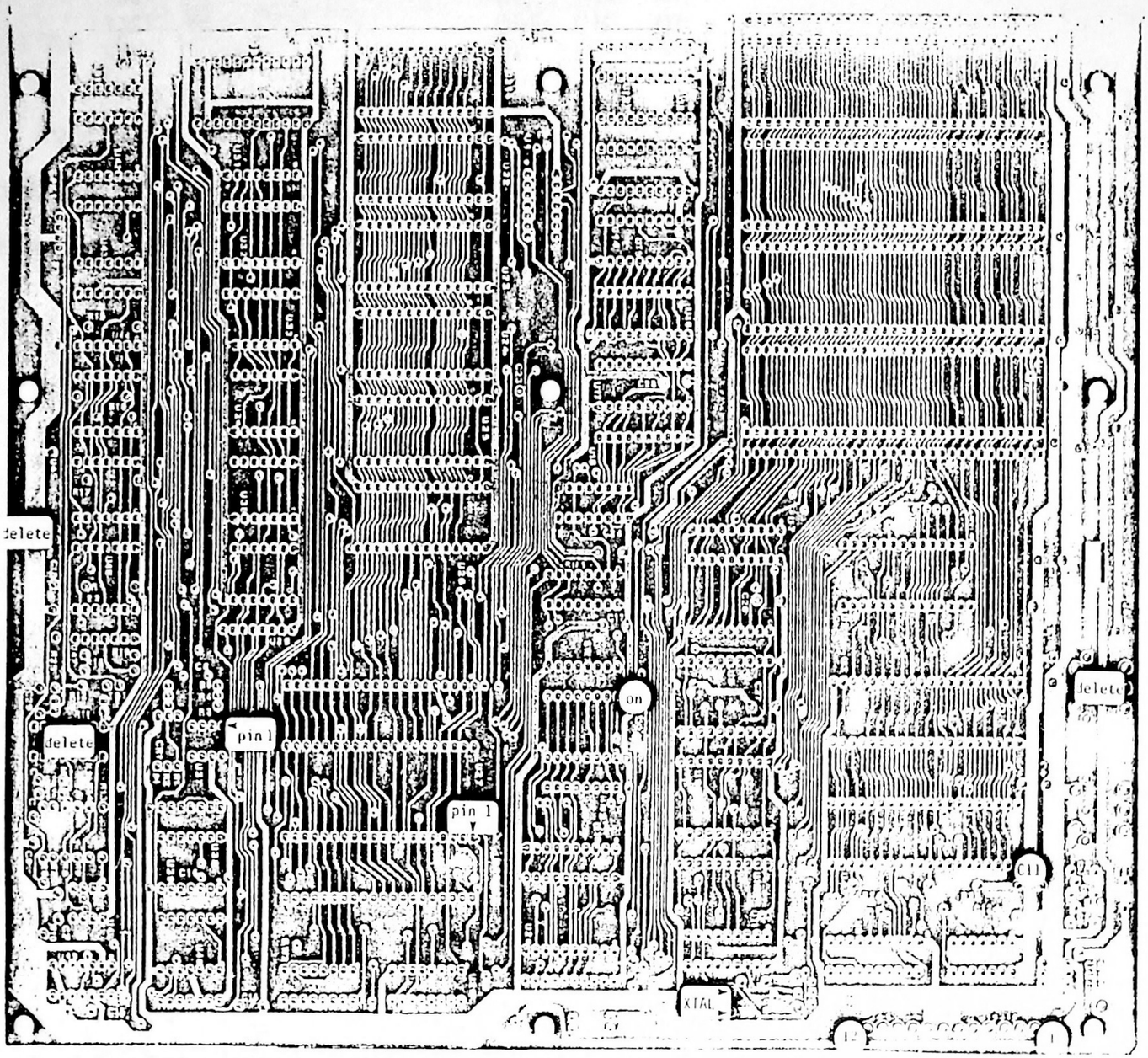
SW2 positions 2, 3 and 4 indicate memory used:

Amount of Memory	Switch Positions 2	3	4
64k	ON	ON	ON
128k	OFF	ON	ON
192k	ON	OFF	ON
256k	OFF	OFF	ON
320k	ON	ON	OFF
384k	OFF	ON	OFF
448k	ON	OFF	OFF
512k	OFF	OFF	OFF

SW2 positions 5, 6, 7 and 8 are always set OFF.

GUIDE PC-3

ECS MOTHERBOARD: Features include: 8088 MPU with socket for optional 8087 co-processor; five I/O expansion slots, PC spacing of 25 mm; no on-board memory; six ROM sockets; cassette port available.



actual size
29.3 cm x 26.0 cm
(layout is reduced)

NuScope Associates

ECS MOTHERBOARD (continued):

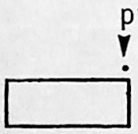
DIODES D *Position banded (cathode) end of diode towards the arrow

____ 1 - 1N4001

RESISTORS R ¼ watt, 5%

____ 1 - 47 Ω @ R10
____ 2 - 150 Ω @ R6,25
____ 1 - 220 Ω @ R11
____ 1 - 330 Ω @ R12
____ 3 - 1.2 KΩ @ R7,26,27
____ 1 - 3.9 KΩ @ R9
____13 - 4.7 KΩ @ R8,13,14,15,16,17,18, R19,20,21,22,23,24
____ 4 - 18 KΩ @ R1,2,3,4
____ 1 - 1 MΩ @ R2
____ 2 - 4.7 KΩ 16-pin DIP @ RN1,2
*Solder directly to the board

SOCKETS *Match pin 1 of sockets with pin 1 (dot) on the layout. Check that ALL pins have passed thru ALL holes



____ 2 - 8-pin
____14 - 14-pin
____ 8 - 16-pin
____ 1 - 18-pin
____13 - 20-pin
____ 1 - 24-pin
____ 7 - 28-pin
____ 4 - 40-pin

CAPACITORS C

____ 4 - 56 pF @ C1,2,3,29
____ 2 - 0.01 µF @ C7,9
____ 1 - 0.047 µF @ C8
____23 - 0.1 µF Monolithic @ C4,5,10,11, C13,14,15,16,17,18,19,20, C21,22,23,24,25,26,27,28, C30,31,32

CAPACITORS (continued)

____ 1 - 5-60 pF Trimcap @ C6
____ 1 - 10 µF/16V Axial* @ C12
*Match + of Axial with + on the layout

CRYSTAL Y *Fold crystal flat against the board before soldering

____ 1 - 14.31818 MHz @ Y1

SWITCH

____ 2 - 8-position DIP @ SW1,2

CONNECTORS

____ 1 - 1X4 header, male, 90° @ P3 for speaker (pins 1&4)
____ 1 - 5-pin DIN @ J7 for keyboard
____ 5 - 62-pin card edge connectors @ J1,2,3,4,5
____ 1 - 12-pin Molex, straight @ P1 for power

PINOUT FOR POWER:

pin	for
1	-
2	-
3	+12
4	-12
5,6,7,8	GND
9	-5
10,11,12	+5

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 (dot) on the layout

____ 2 - 74LS00 @ U41,44
____ 2 - 74LS02 @ U1,33
____ 3 - 74LS04 @ U39,46,47
____ 1 - 74LS08 @ U35
____ 1 - 74LS10 @ U45
____ 1 - 74LS20 @ U34
____ 1 - 74LS30 @ U5
____ 1 - 74LS38 @ U38
____ 3 - 74LS74 @ U40,42,43
____ 1 - 74LS125 @ U49
____ 2 - 74LS138 @ U31,32
____ 2 - 74LS175 @ U29,36
____ 4 - 74LS244 @ U14,15,16,19
____ 3 - 74LS245 @ U8,12,13
____ 1 - 74LS322 @ U20
____ 4 - 74LS373 @ U7,9,10,17
____ 1 - 74LS670 @ U18

____ 1 - LM41 @ U37
____ 1 - 75477 @ U48

____ 1 - 8087 @ U4 (optional)
____ 1 - 8088 @ U3 MPU
____ 1 - 8237A @ U27
____ 1 - 8253-5 @ U30
____ 1 - 8255A-5 @ U28
____ 1 - 8259A @ U2
____ 1 - 8284A @ U11
____ 1 - 8288 @ U6

____ 1 - 2764 @ U26 Boot EPROM

____ 5 - 2764 @ U21,22,23,24,25 (optional)

ECS MOTHERBOARD (continued):

SWITCH # 1 SETTINGS:

POSITION 2: remains off- reserved for the co-processor

POSITIONS 3 & 4: remain off - indicate a minimum configuration of 64K bytes

POSITIONS 5 & 6: define video board type as follows:

video board type	settings 5	6
colour (40x25)	off	on
colour (80x25)	on	off
black/white or both	off	off
none	on	on

POSITIONS 1, 7 & 8: define the number of floppy disc drives in use:

number of drives	settings 1	7	8
0	on	on	on
1	off	on	on
2	off	off	on
3	off	on	off
4	off	off	off

SWITCH # 2 SETTINGS:

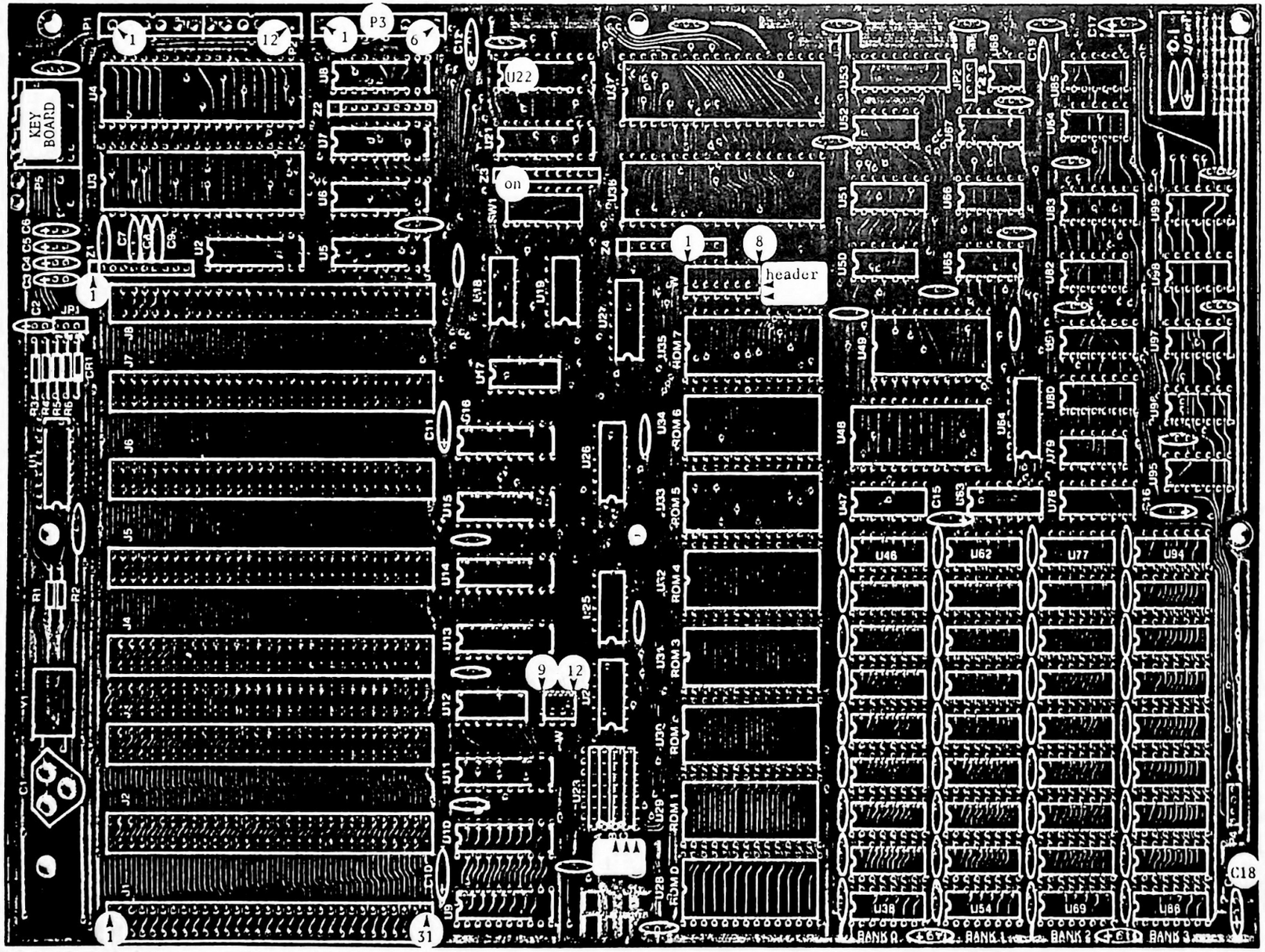
POSITIONS 5, 6, 7 & 8: always remain off

POSITIONS 1, 2, 3 & 4: qualify memory as follows:

memory	settings 1	2	3	4
64K	on	on	on	on
128K	on	off	on	on
192K	on	on	off	on
256K	on	off	off	on

GUIDE XT-1

ROBIN HOOD MOTHERBOARD: FEATURES: 8088 MPU with socket for optional 8087 co-processor; eight I/O expansion slots, XT spacing of 20 mm; on-board memory in blocks of 64 K to a maximum of 256 K using 4164 or equivalent RAM ICs; eight ROM sockets; documentaion and schematics available from supplier.



actual size
30.3 cm x 21.6 cm
(layout is reduced)

NuScope Associates

ROBIN HOOD XT MOTHERBOARD:

DIODES D *Position banded (cathode) end of diode towards the bar

____ 1 - 1N4148 (1N914) @ CR1

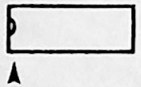
SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

____ 3 - 27 Ω @ R3,4,5
____ 2 - 510 Ω @ R1,2
____ 1 - 1 KΩ @ R6
____ 2 - 33 Ω 16-pin DIP @ U63,78
Solder directly to the board
Sixteen 33 Ω resistors may be substitued for the two DIP packages
____ 4 - 4.7 KΩ 10-pin SIP* @ Z1,2,3,4
*Match pin 1 of SIPs with pin 1 (square) on the layout

SOCKETS * Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 1 - 8-pin
____19 - 14-pin
____47 - 16-pin
____ 1 - 18-pin
____15 - 20-pin
____ 1 - 24-pin
____ 9 - 28-pin
____ 4 - 40-pin



CAPACITORS C

____ 3 - 47 pF (50 pF) @ C7,8,9
____ 1 - 0.01 µF @ C19
____64 - 0.1 µF Monolithic* @

*Note TWO different spacing between pads. Select correct pads

____14 - 10 µF/25V Tantalum* @ C2,3,4,5,6,10,11,12,13,14,15, C16,17,18 *Match + of Tantalum with + on the layout

____ 1 - 5-50 pF Trimcap @ C1

CRYSTAL Y *Fold crystal flat against the board before soldering. Solder the crystal case to the grounding pad on the board

____ 1 - 14.31818 MHz @ Y1

SWITCHES

The following switch (SW1) is used to select the system configuration

____ 1 - 8-position DIP

The following TWO switches (W) are used to select EPROM/ROM type. Install 74LS138 IC @ U23 (A,B or C) accordingly

____ 1 - 8-position DIP @ W (W1 to 8) (or 2x8 header)
____ 1 - 4-position DIP @ W (W9 to 12) (or 2x4 header)

CONNECTORS

____ 2 - 1x3 header, male, straight @ JP2 strap 2-3
____ 1 - jumper plug on pins 2 & 3 of JP1
____ 1 - 1x4header, male 90° @ P4 for speaker
____ 1 - 12-pin power connector @ P1,P2
____ 1 - 6-pin power connector @ P3 (Apple-type supply)
____ 8 - 62-pin edge card connectors @ J1,2,3,4,5,6,7
____ 1 - 5-pin DIN Keyboard connector @ P5

PINOUT FOR POWER SUPPLY

AT P1-P2		AT P3	
pin #	for	pin #	for
1	power good	1,2	+5V
2	key	3	-12V
3	+12V	4	-5V
4	-12V	5	+12V
5,6,7,8	GND	6	GND
9	-5V		
10,11,12	+5V		

DELAY LINE ____ 1 - 100 ns @ U95

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U85
____ 2 - 74LS02 @ U24,97
____ 2 - 74LS04 @ U18,67
____ 1 - 74LS10 @ U84
____ 2 - 74LS20 @ U12,66
____ 1 - 74LS27 @ U17
____ 1 - 74LS32 @ U50
____ 2 - 74LS74 @ U52,82
____ 3 - 74LS138 @ U23,51,81
____ 2 - 74LS175 @ U27,83
____ 6 - 74LS244 @ U6,9,10,11,16,21
____ 4 - 74LS245 @ U2,13,14,22
____ 1 - 74LS322 @ U53
____ 3 - 74LS373 @ U5,7,15
____ 1 - 74LS670 @ U26

____ 2 - 74S00 @ U96,99
____ 2 - 74S08 @ U79,98
____ 1 - 74S74 @ U65
____ 1 - 74S138 @ U80
____ 2 - 74S157 @ U47,64
____ 1 - 74S280 @ U25

____ 1 - 7407 @ U19
____ 1 - 75477 @ U68

____ 1 - 8088 @ U3 MPU
____ 1 - 8087 @ U4 (optional)
____ 1 - 8237A-5 @ U36
____ 1 - 8253-5 @ U49
____ 1 - 8255A-5 @ U37
____ 1 - 8259A @ U48
____ 1 - 8284A @ U1
____ 1 - 8288 @ U8

____18 - 4164 DRAM 200ns standard @ U38-46 & U54-62
____18 - 4164 DRAM 200 ns optional @ U69-77 & U86-94
____ 1 - 2764 Boot EPROM 250 ns @ ROM 7
____ 7 - 2764 EPROMs optional @ ROM 0,1,2,3,4,5,6

ROBIN HOOD XT MOTHERBOARD (continued)

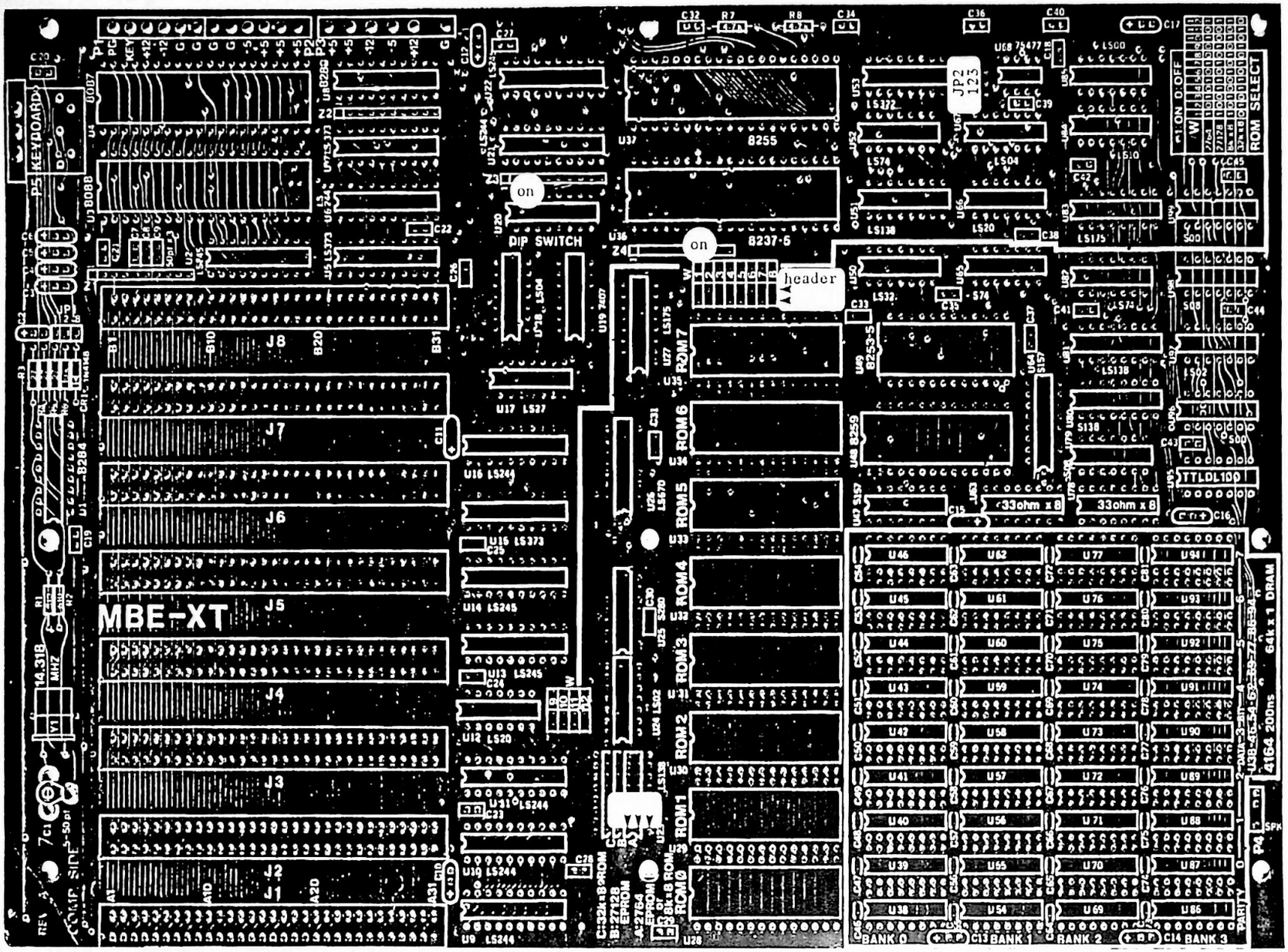
SWITCH SW1 SETTINGS: SYSTEM CONFIGURATION

SWITCH #	1	2	3 4	5 6	7 8
OPERATING MODE		8087	RAM	monitor	drive #
	normal off	no 8087 on with 8087 off	128K off on 192K on off 256K off off	none on on 40x25 colour off on 80x25 colour on off monochrome off off	1 on on 2 off on 3 on off 4 off off

EPROM/ROM SELECTION (SWITCHES W); LOCATION OF MEMORY DECODER (U23 74LS138):

EPROM/ROM SELECTION													LOCATION OF U23
	W - near ROM 7								W - near U12				
W number	1	2	3	4	5	6	7	8	9	10	11	12	position
2764 EPROM	on	off	on	off	on	off	on	off	off	on	off	on	A
27128 EPROM	on	off	off	on	on	off	on	off	on	off	off	on	B
8Kx8 ROM	on	off	on	off	off	on	off	on	off	on	off	on	A
32Kx8 ROM	off	on	off	on	on	off	on	off	on	off	on	off	C

MBE-XT MOTHERBOARD: Features include: 8088 MPU with socket for optional 8087 co-processor; eight I/O expansion slots XT spacing of 20 mm; on-board memory in blocks of 64 K to a maximum of 256 K using 4164 or equivalent RAM chips; eight ROM sockets; documentaion and schematics available from supplier.



actual size
30.3 cm x 21.5 cm
(layout is reduced)

D.L. Scott Associates

MBE-XT MOTHERBOARD (continued)

DIODE D *Position banded (cathode) end of diode towards the arrow

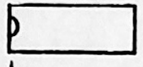
____ 1 - 1N4148 @ CR1

RESISTORS R ¼ watt, 5%

____ 3 - 27 Ω @ R3,4,5
____ 2 - 510 Ω @ R1,2
____ 2 - 4.7 KΩ @ R7,8
____ 1 - 10 KΩ @ R6
____ 4 - 4.7 KΩ 10-pin SIP* @ Z1,2,3,4
*Match pin 1 of SIPs with pin 1 (square) on the layout
____ 2 - 33 Ω 16-pin DIP* @ U63,78
*Solder directly to the board

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 1 - 8-pin
____19 - 14-pin
____45 - 16-pin
____ 1 - 18-pin
____15 - 20-pin
____ 1 - 24-pin
____ 9 - 28-pin
____ 4 - 40-pin



CAPACITORS C

____ 3 - 50 pF (47 pF) @ C7,8,9
____ 1 - 0.01 µF @ C18
____62 - 0.1 µF Monolithic @ C19 to 81
____13 - 10 µF/25V Tantalum* @ C2,3,4,5,6 C10,11,12,13,14,15,16,17
*Match + of Tantalum with + on the layout
____ 1 - 5-50 pF Trimcap @ C1

CRYSTAL *Fold crystal flat against the board before soldering. Solder the case to the grounding pad under crystal

____ 1 - 14.31818 MHz @ Y1

SWITCHES

____ 1 - 8-position DIP @ U20 for board setup

for EPROM/ROM switch settings use EITHER DIP switches OR headers

____ 1 - 8-position DIP @ W1-8
____ 1 - 4-position DIP @ W9-12
OR
____ 1 - 2x8 header, male straight @ W1-8
____ 1 - 2x4 header, male straight @ W9-12
____ - - jumper plugs

CONNECTORS

____ 2 - 1x3 header, male, straight @ JP1 for power reset @ JP2
____ 1 - 1x4 header, male, straight @ P4 for speaker
____ 1 - 12-pin power connector @ P1,P2
____ 1 - 6-pin power connector @ P3 (Apple-type supply)
____ 8 - 62-pin card edge connectors @ J1,2,3,4,5,6,7,8
____ 1 - 5-pin DIN keyboard connector @ P5

DELAY LINE

____ 1 - 100 ns @ U95
*Solder directly to the board

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U85
____ 2 - 74LS02 @ U24,97
____ 2 - 74LS04 @ U18,67
____ 1 - 74LS10 @ U84
____ 2 - 74LS20 @ U12,66
____ 1 - 74LS27 @ U17
____ 1 - 74LS32 @ U50
____ 2 - 74LS74 @ U52,82
____ 3 - 74LS138 @ U23,51,81
____ 2 - 74LS175 @ U27,83
____ 6 - 74LS244 @ U6,9,10,11,16,21
____ 4 - 74LS245 @ U2,13,14,22
____ 1 - 74LS322 @ U53
____ 3 - 74LS373 @ U5,7,15
____ 1 - 74LS670 @ U26

____ 2 - 74S00 @ U96,99
____ 2 - 74S08 @ U79,98
____ 1 - 74S74 @ U65
____ 1 - 74S138 @ U80
____ 2 - 74S157 @ U47,64
____ 1 - 74S280 @ U25

____ 1 - 7407 @ U19
____ 1 - 75477 @ U68

____ 1 - 8088 @ U3 MPU
____ 1 - 8087 @ U4 (optional)
____ 1 - 8237A-5 @ U36
____ 1 - 8253-5 @ U49
____ 1 - 8255A-5 @ U37
____ 1 - 8259A @ U48
____ 1 - 8284A @ U1
____ 1 - 8288 @ U8

____18 - 4164 RAM 200 ns (standard) @ U38-46 & U54-62
____18 - 4164 RAM 200 ns (optional) @ U69-77 @ U86-94
____ 1 - 2764 Boot EPROM 250 ns (standard) @ ROM 7
____ 7 - 2764 EPROMs (optional) @ ROM 0-6

MBE-XT MOTHERBOARD (continued)

SWITCH SW1 SETTINGS: SYSTEM CONFIGURATION

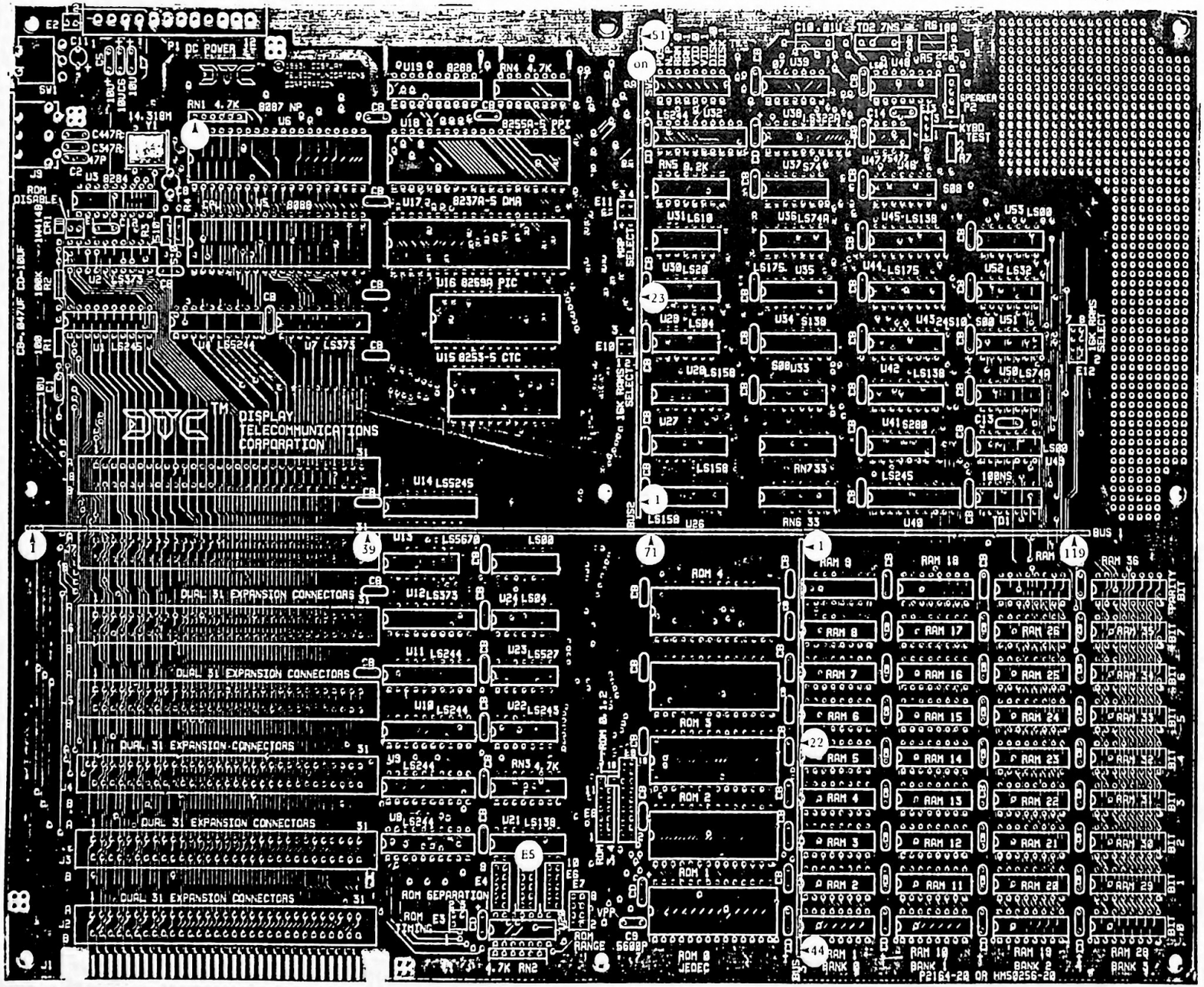
SWITCH #	1	2	3 4	5 6	7 8
OPERATING MODE		8087	RAM	monitor	drive #
	normal off	no 8087 on	128K off on	none on on	1 on on
		with 8087 off	192K on off	40x25 colour off on	2 off on
			256K off off	80x25 colour on off	3 on off
				monochrome off off	4 off off

EPROM/ROM SELECTION AND LOCATION OF MEMORY DECODER (U23 74LS138):

EPROM/ROM SELECTION													LOCATION OF U23
	W - near ROM 7								W - near U12				
W number	1	2	3	4	5	6	7	8	9	10	11	12	position
2764 EPROM	on	off	on	off	on	off	on	off	off	on	off	on	A
27128 EPROM	on	off	off	on	on	off	on	off	on	off	off	on	B
8Kx8 ROM	on	off	on	off	off	on	off	on	off	on	off	on	A
32Kx8 ROM	off	on	off	on	on	off	on	off	on	off	on	off	C

GUIDE XT-3

MEGA-BOARD MOTHERBOARD: Features include: 8088 MPU with socket for optional 8087 co-processor; eight I/O expansion slots, XT spacing of 20 mm (connector J1 provides external bus expansion via a 62-pin gold-plated card edge connector; on-board memory in blocks of 64 K to a maximum of 256 K using 4164 or equivalent ICs, or to a maximum of 1 M using 256 K RAM ICs; five ROM sockets jumper programmable to accept 8,16,32,64 K ROM and EEPROM ICs; hardware reset switch; wire-wrap area; documentaion and schematics available from supplier.



*Not ALL bus bar pin numbers are shown

actual size
34.3 cm x 26.6 cm
(layout is reduced)

NuScope Associates

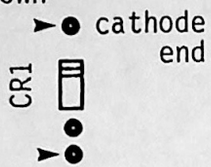
MEGA-BOARD MOTHERBOARD (continued)

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

Use the bare board as a guide to prepare the three bus bars. Install later.

DIODES D *Position banded (cathode) end of diode as shown

____ 1 - 1N4148 @ CR1



RESISTORS R ¼ watt, 5%

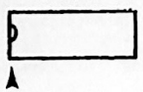
____ 1 - 33 Ω @ R7 ½ watt
____ 1 - 100 Ω @ R1
____ 1 - 180 Ω @ R6
____ 1 - 220 Ω @ R5
____ 2 - 510 Ω @ R3,4
____ 1 - 100 KΩ @ R2
____ 2 - 4.7 K 6-pin SIP* @ RN1,2
*Match pin 1 of SIPs with pin 1 on the layout

*Solder the following DIP resistor networks directly to the board

____ 1 - 33 Ω 16-pin DIP isolated @ R6,7
____ 2 - 4.7 KΩ 16-pin DIP @ RN3,4
____ 1 - 8.2 KΩ 16-pin DIP @ RN5

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 1 - 8-pin
____ 21 - 14-pin
____ 53 - 16-pin
____ 1 - 18-pin
____ 14 - 20-pin
____ 1 - 24-pin
____ 6 - 28-pin
____ 4 - 40-pin



pin 1 (square pad) for ALL sockets and ICs

CAPACITORS C

____ 3 - 47 pF Monolithic @ C2,3,4
____ 1 - 100 pF Monolithic @ C13
____ 1 - 5600 pF Monolithic @ C9*
*For EEPROM programming only

CAPACITORS (continued)

____ 1 - 0.01 µF Mylar, Axial @ C10
____ 78 - 0.1 µF Monolithic @ C12,14 & positions CB (bypass)
____ 14 - 10 µF/16V Tantalum* @ C1,5,6, C7,11 & positions CD
*Match + of Tantalums with + on the layout
____ 1 - 6-30 pF Trimcap @ C8

CRYSTAL Y *Fold crystal flat against the board before soldering. Solder case to grounding pad under crystal

____ 1 - 14.31818 MHz @ Y1

SWITCH

____ 1 - Minature PB, momentary contact @ SW1
____ 1 - 8-position DIP @ SW2

BUS BARS

____ 3 - bus bars, 10 pins per inch
Prepare in the following manner: Cut bus bars to length. Mark pins to be used with a felt pen. Remove unused pins with needle-nosed pliers. Check that tabs are cleanly removed and cannot cause a short circuit with the bar installed. Install and solder.

____ BUS 1: 30.0 cm Use pins 1,7,10, 19,39,51,59,71,83,87,88,100, 107,119
____ BUS 2: 12.9 cm Use pins 1,7,17, 23,39,51
____ BUS 3: 11.1 cm Use pins 1,2,4,10, 22,28,32,36,40,44

HEADERS All are male, straight

____ 2 - 1x2 pins @ E2,3
____ 3 - 2x5 pins @ E4,5,6
____ 1 - 2x4 pins @ E7
*E8 & E9 are non-standard

HEADERS (continued)

____ 1 - 2x7 pins @ E8 *Remove pin 14 before installing
____ 1 - 2x9 pins @ E9 *Add one pin at 13
____ 1 - 1 pin @ VPP
____ 1 - 1x4 pins @ P2 use pins 1 & 4

CONNECTORS

____ 1 - 12-pin Molex, straight @ P1

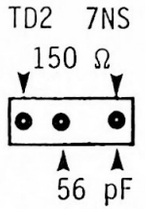
PINOUT FOR POWER:

pin	for
1	Reset (Power ready)
2	Key
3	+12
4	-12
5,6,7,8	GND
9	-5
10,11,12	+5

____ 1 - 5-pin DIN
____ 7 - 62-pin card edge-connectors

DELAY LINES *Solder to the board

____ 1 - 100 ns digital @ TD1 *Install in socket
____ 1 - 7 ns inductive @ TD2**
**Required only for 256 K RAM chips - otherwise install one 150 Ω resistor & one 56 pF capacitor as shown



MEGA-BOARD MOTHERBOARD (continued)

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 3 - 74LS00 @ U25,49,53
____ 3 - 74LS04 @ U24,29,48
____ 1 - 74LS10 @ U31
____ 1 - 74LS20 @ U30
____ 1 - 74LS27 @ U23
____ 1 - 74LS30 @ U20
____ 1 - 74LS32 @ U52
____ 2 - 74LS74 @ U36,50
____ 3 - 74LS138 @ U21,42,45
____ 3 - 74LS158 @ U26,27,28†
____ 2 - 74LS175 @ U35,44
____ 1 - 74LS243 @ U22
____ 6 - 74LS244 @ U4,8,9,10,11,32
____ 3 - 74LS245 @ U1,14,40
____ 1 - 74LS322A @ U38
____ 3 - 74LS373 @ U2,7,12
____ 1 - 74LS670 @ U13

____ 1 - 74S00 @ U51
____ 2 - 74S08 @ U33,46
____ 1 - 74S74 @ U37
____ 1 - 74S138 @ U34
____ 1 - 74S280 @ U41

____ 1 - 7407 @ U39
____ 1 - 75477 @ U47

____ 1 - 8087 @ U6 (optional)
____ 1 - 8088 @ U5 MPU
____ 1 - 8237A-5 @ U17
____ 1 - 8253-5 @ U15
____ 1 - 8255A-5 @ U18
____ 1 - 8259A @ U16
____ 1 - 8284 @ U3
____ 1 - 8288 @ U19

†Equip U28 only when using 256 K RAM ICs

INTEGRATED CIRCUITS (continued)

____ 1 - 24S10 (TI) 256x4 bipolar PROM @ U43
____ 1 - 2764 Boot EPROM @ ROM 4
____ 4 - 2764 EPROMs @ ROM Ø,1,2,3
____ 9 - 4164 64K bit DRAM 200 ns @ BANK 0
____27 - 4164 64K bit DRAM 200 ns @ BANK 1,2,3 (optional)

STRAPPING Refer to documentation for a detailed description

*Terminal numbering on E8 & E9 is non-standard, especially terminals 13,14,15

FOR ROM DISABLE:
E1 not equipped

FOR POWER RESET
E2 equip only if power supply provides pin 1 reset

FOR 64 K EPROMs (2764)

location	strap
E3	1-2
E4,5,6	7-8
E7	3-4
	5-6
	7-8
E8	1-3
	5-6
	8-10
	11-12
E9	1-2
	5-7
	10-12
	14-15
	18-19

STRAPPING (continued)

FOR 64 K DRAM
E10,11,12 not equipped

FOR KEYBOARD TEST
E13 not equipped

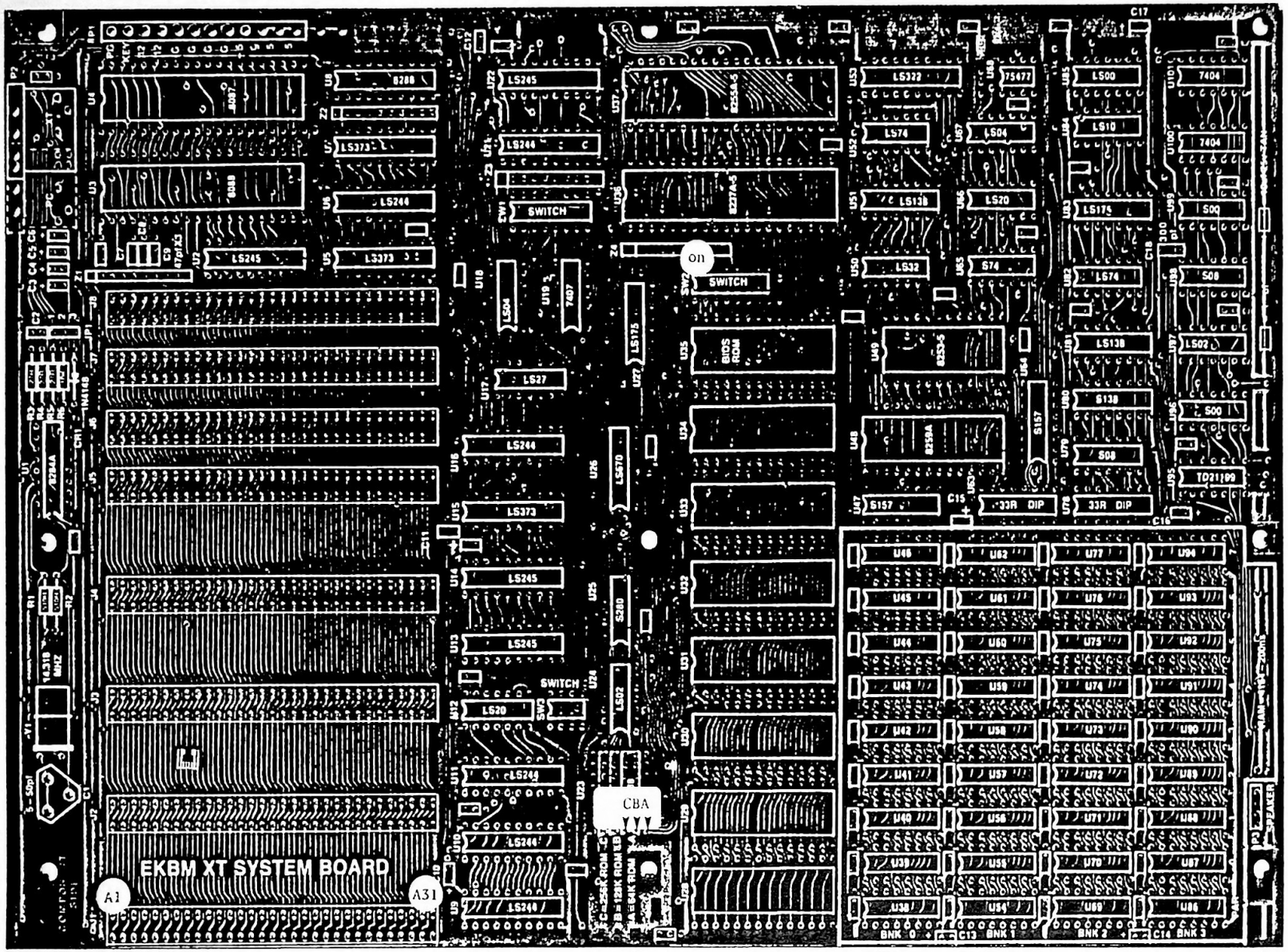
ROMs:

location	starting address	function
ROM Ø	F6ØØ	4th BASIC ROM
ROM 1	F8ØØ	3rd BASIC ROM
ROM 2	FAØØ	2nd BASIC ROM
ROM 3	FCØØ	1st BASIC ROM
ROM 4	FEØØ	boot ROM

SWITCH SW2 SETTINGS: SYSTEM CONFIGURATION

SWITCH #	1	2	3 4	5 6	7 8
OPERATING MODE		8087	RAM	monitor	drive #
	normal off	no 8087 on	128K off on	none on on	1 on on
		with 8087 off	192K on off	40x25 colour off on	2 off on
			256K off off	80x25 colour on off	3 on off
				monochrome off off	4 off off

EKBM XT SYSTEM MOTHERBOARD: Features include: 8088 MPU with socket for optional 8087 co-processor; eight I/O expansion slots, PC spacing of 25 mm; on-board memory in blocks of 64 K to a maximum of 256 K using 4164 or equivalent chips; eight ROM sockets; documentation available from supplier.



actual size
30.3 cm x 21.6 cm
(layout is reduced)

NuScope Associates

EKBM XT SYSTEM MOTHERBOARD (continued)

DIODE D *Position banded (cathode) end of diode towards the arrow

____ 1 - 1N4148 @ CR1

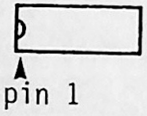
RESISTORS R ¼ watt, 5%

____ 3 - 27 Ω @ R3,4,5
____ 2 - 510 Ω @ R1,2
____ 1 - 10 KΩ @ R6
____ 4 - 4.7 KΩ 10-pin (9 resistor) SIP* @ Z1,2,3,4 *Match pin 1 of SIPs with the square on the layout
____ 2 - 33 Ω 16-pin DIP @ U63,78

*Solder directly to the board. (Eight 33 Ω resistors may be substituted for each DIP)

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 1 - 8-pin
____21 - 14-pin
____45 - 16-pin
____ 1 - 18-pin
____15 - 20-pin
____ 1 - 24-pin
____ 9 - 28-pin
____ 4 - 40-pin



CAPACITORS C

____ 3 - 47 pF @ C7,8,9
____ 1 - 300 pF @ C18
____65 - 0.1 µF Monolithic @
____13 - 10 µF/25V Tantalum* @ C2,3,4,5,6 C10,11,12,13,14,15,16,17

*Match + of Tantalum capacitors with + on the layout

____ 1 - 5-50 pF Trimcap @ C1

CRYSTAL Y *Fold crystal flat against the board before soldering. Solder the case to the two grounding pads

____ 1 - 14.31818 MHz @ Y1

SWITCHES

____ 1 - 8-position DIP @ SW1 for system configuration
____ 1 - 8-position DIP @ SW2 for ROM selection
____ 1 - 4-position DIP @ SW3 for ROM selection

CONNECTORS

____ 1 - 1x3 header, male, straight @ JP1
____ 1 - 1x4 header, male, 90° @ P3 for speaker
____ 1 - 12-pin, male, Molex @ P1 for power
____ 8 - 62-pin edge card connectors @ J1,2,3,4,5,6,7,8
____ 1 - 5-pin DIN, 90° @ P2 *Position @ either position PC or XT

DELAY LINE

____ 1 - 100 ns @ U95 Solder directly to the board

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U85
____ 2 - 74LS02 @ U24,97
____ 2 - 74LS04 @ U18,67
____ 1 - 74LS10 @ U84
____ 2 - 74LS20 @ U12,66
____ 1 - 74LS27 @ U17
____ 1 - 74LS32 @ U50
____ 2 - 74LS74 @ U52,82
____ 3 - 74LS138 @ U23,51,81
____ 2 - 74LS175 @ U27,83
____ 6 - 74LS244 @ U6,9,10,11,16,21
____ 4 - 74LS245 @ U2,13,14,22
____ 1 - 74LS322 @ U53
____ 3 - 74LS373 @ U5,7,15
____ 1 - 74LS670 @ U26

____ 2 - 74S00 @ U96,99
____ 2 - 74S08 @ U79,98
____ 1 - 74S74 @ U65
____ 1 - 74S138 @ U80
____ 2 - 74S157 @ U47,64
____ 1 - 74S280 @ U25

____ 2 - 7404 @ U100,101
____ 1 - 7407 @ U19
____ 1 - 75477 @ U68

____ 1 - 8088 @ U3 MPU
____ 1 - 8087 @ U4 (optional)
____ 1 - 8237A-5 @ U36
____ 1 - 8253-5 @ U49
____ 1 - 8255A-5 @ U37
____ 1 - 8259A @ U48
____ 1 - 8284A @ U1
____ 1 - 8288 @ U8

____ 9 - 4164 RAM, 200 ns @ BNK 0
____27 - 4164 RAM (optional) @ BNK1,2,3
____ 1 - 2764 EPROM, 200 ns @ U23 BIOS ROM
___ 7 - 2764 EPROM (optional) @ U28,29,30,31,32,33,34

EKBM XT SYSTEM MOTHERBOARD (continued)

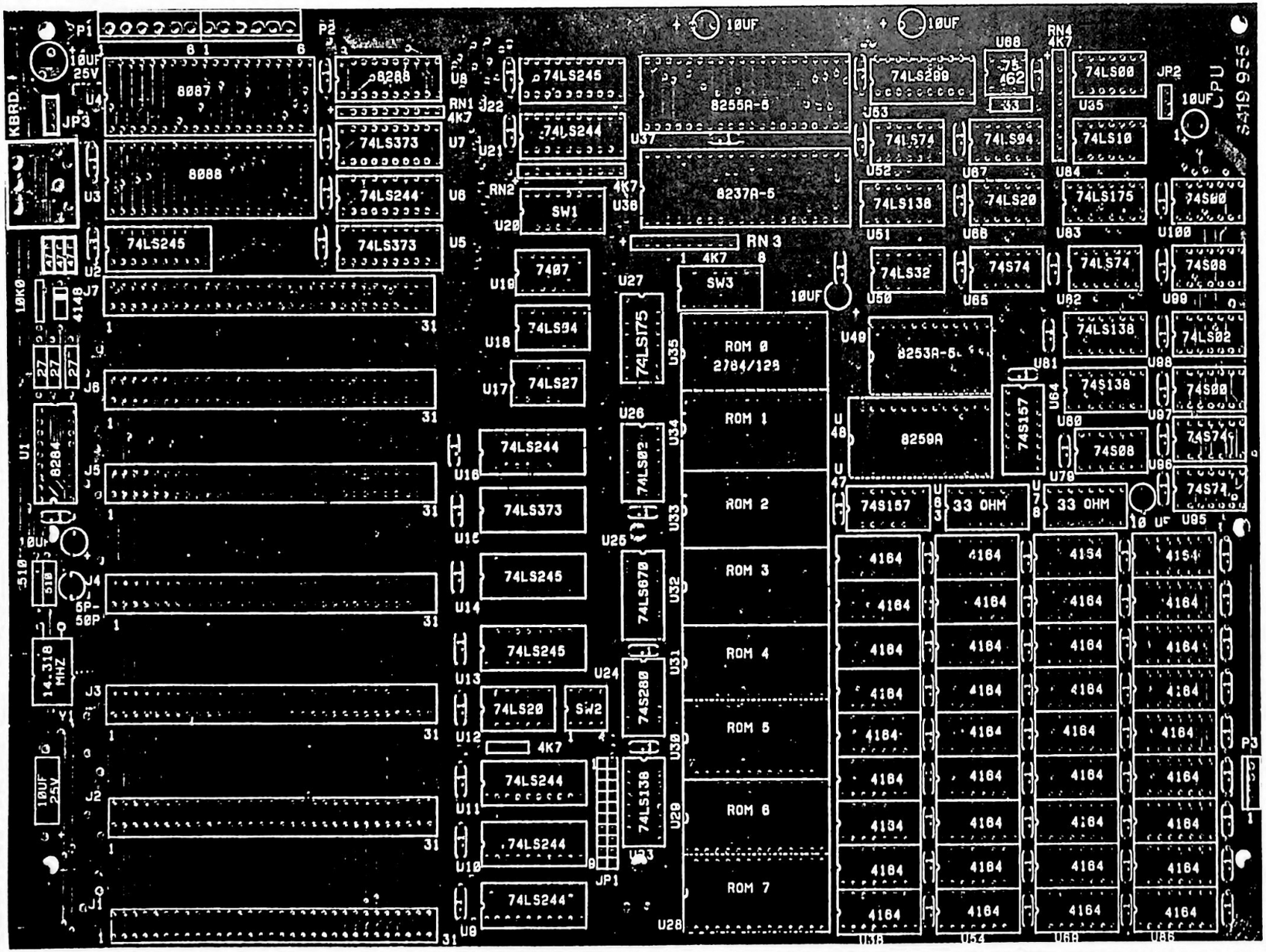
SWITCH SW1 SETTINGS: SYSTEM CONFIGURATION

SWITCH #	1	2	3 4	5 6	7 8
		8087	RAM	monitor	drive #
OPERATING MODE	normal off	no 8087 on with 8087 off	128K off on 192K on off 256K off off	none on on 40x25 colour off on 80x25 colour on off monochrome off off	1 on on 2 off on 3 on off 4 off off

EPROM SELECTION SW2,3 - LOCATION OF MEMORY DECODER (U23 74LS138)

EPROM/ROM SELECTION													LOCATION OF U23
	SW2								SW3				note position of pin 1 on layout
switch no	1	2	3	4	5	6	7	8	9	10	11	12	
2764 EPROM	on	off	on	off	on	off	on	off	off	on	off	on	A
27128 EPROM	on	off	off	on	on	off	on	off	on	off	off	on	B
8Kx8 ROM	on	off	on	off	off	on	off	on	off	on	off	on	A
32Kx8 ROM	off	on	off	on	on	off	on	off	on	off	on	off	C

PRESTIGE I XT: Features include: 8088 MPU with socket for optional 8087 co-processor; seven I/O expansion slots, PC spacing of 25 mm; on-board memory in blocks of 64 K to a maximum of 256 K using 4164 or equivalent RAM chips; eight ROM sockets. Documentation and schematics are available from supplier.



actual size
30.3 x 21.6 cm
(layout is reduced)

PRESTIGE I XT MOTHERBOARD (cont)

DIODE D *Position banded (cathode) end of diode towards the square

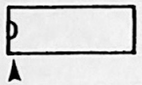
____ 1 - 1N4148 @ 4148

RESISTORS R ¼ watt, 5%

____ 3 - 27 Ω
____ 1 - 33 Ω
____ 2 - 510 Ω
____ 1 - 4.7 KΩ
____ 1 - 10 KΩ
____ 4 - 4.7 KΩ 10-pin SIP @ RN1,2,3,4
*Match pin 1 of SIPs with pin 1 (+) on the layout
____ 2 - 33 Ω 16-pin DIP @ U63,78
*Solder directly to the board
*Sixteen 33 Ω resistors may be substituted at U63,78

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____21 - 14-pin
____47 - 16-pin
____ 1 - 18-pin
____15 - 20-pin
____ 1 - 24-pin
____ 9 - 28-pin
____ 4 - 40-pin



CAPACITORS C

____ 3 - 47 pF
____75 - 0.1 µF Monolithic @ .1
____ 1 - 5-50 pF Trimcap
*Match + of the following caps with + on the layout
____ 1 - 10 µF/25V Axial*
____ 7 - 10 µF/25V Tantalum* @ +

CRYSTAL *Fold crystal flat against the board before soldering. Solder the case to the grounding pads

____ 1 - 14.31818 MHz @ Y1

SUGGESTED SEQUENCE *INDICATES A PRECAUTION *MODIFICATION REQUIRED

SWITCHES SW

____ 1 - 4-position DIP @ SW2
____ 1 - 8-position DIP @ SW1,3

CONNECTORS

____ 1 - 2x9 header, male, straight @ JP1
____ 2 - 1x3 header, male, straight @ JP2,3
____ 1 - 1x4 header, male, straight @ P3
____ 1 - 12-pin power connector @ P1,P2
____ 8 - 62-pin card edge connectors @ J1,2,3,4,5,6,7,8
____ 1 - 5-pin DIN Keyboard connector @ KBRD

POWER PINOUT

	pin #	for
P1:	1	power good
	2	key
	3	+12
	4	-12
	5,6	GND
P2:	1,2	GND
	3	-5
	4,5,6	+5

STRAP:

____ upper two pins of JP2
____ lower two pins of JP3

INTEGRATED CIRCUITS *Match pin 1 of IC with pin 1 on the layout

____ 1 - 74LS00 @ U85
____ 2 - 74LS02 @ U26,98
____ 2 - 74LS04 @ U18,67
____ 1 - 74LS08 @ U99
____ 1 - 74LS10 @ U84
____ 2 - 74LS20 @ U12,66
____ 1 - 74LS27 @ U17
____ 1 - 74LS32 @ U50
____ 2 - 74LS74 @ U52,82
____ 3 - 74LS138 @ U23,51,81
____ 2 - 74LS175 @ U27,83
____ 6 - 74LS244 @ U6,9,10,11,16,21(SIG)
____ 4 - 74LS245 @ U2,13,14,22
____ 1 - 74LS299 @ U53
____ 3 - 74LS373 @ U5,7,15
____ 1 - 74LS670 @ U25

____ 2 - 74S00 @ U97,100
____ 1 - 74S08 @ U79
____ 3 - 74S74 @ U65,95,96
____ 1 - 74S138 @ U80
____ 2 - 74S157 @ U47,64
____ 1 - 74S280 @ U24

____ 1 - 7407 @ U19
____ 1 - 75462 @ U68

____ 1 - 8088 @ U3 MPU
____ 1 - 8087 @ U4 (optional)
____ 1 - 8237A-5 @ U36
____ 1 - 8253-5 @ U49
____ 1 - 8255A-5 @ U37
____ 1 - 8259A @ U48
____ 1 - 8284A @ U1
____ 1 - 8288 @ U8

____18 - 4164 DRAM 150 ns standard @ U38-46 & U54-62
____18 - 4164 DRAM 150 ns (optional) @ U69-77 & U86-94
____ 1 - 2764 Boot EPROM 250 ns @ U35
____ 7 - 2764 EPROMs 250 ns @ U28,29,30,31,32,33,34

PRESTIGE I XT MOTHERBOARD (continued)

SWITCH SW1 SETTINGS: SYSTEM CONFIGURATION

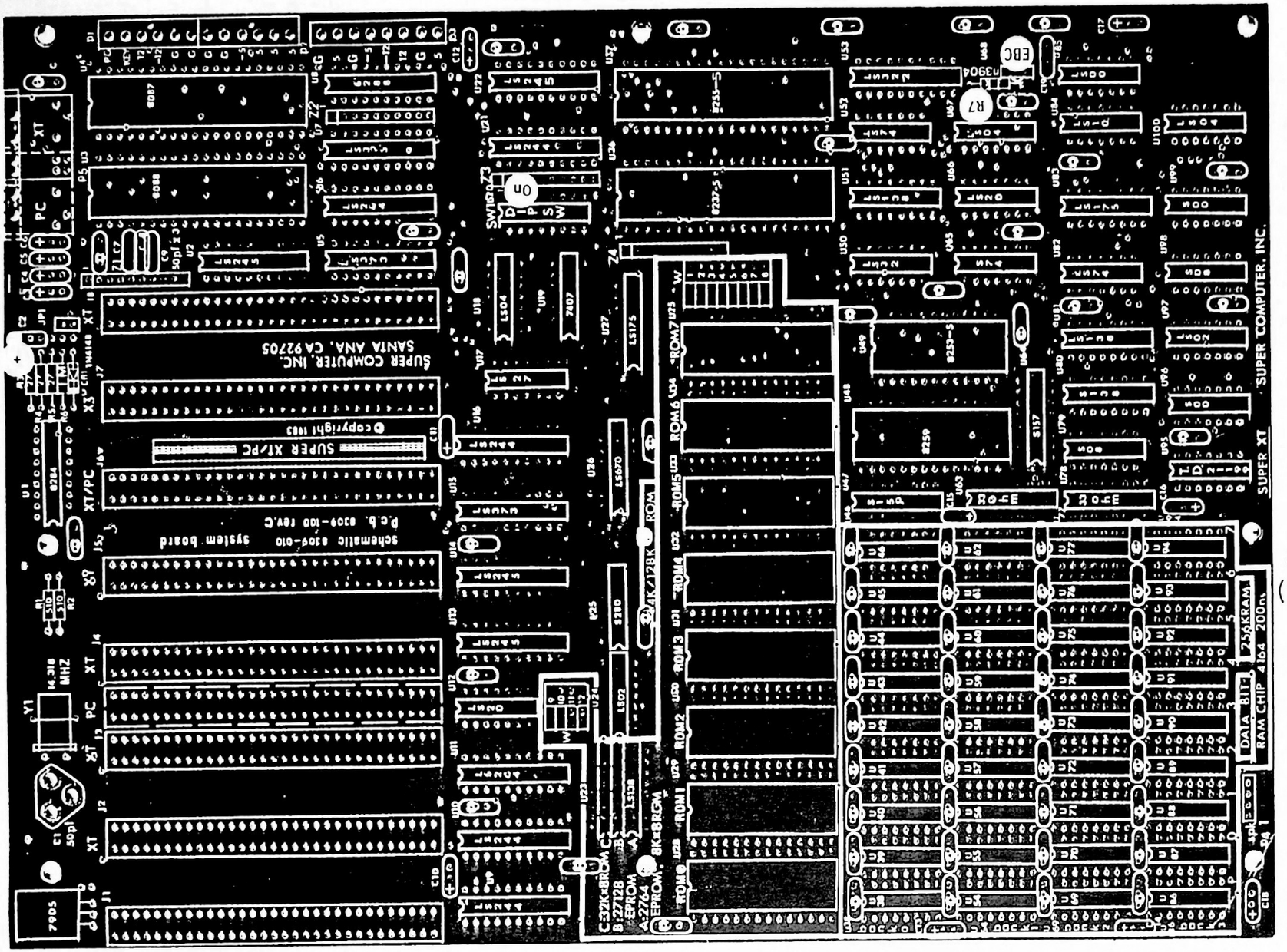
SWITCH #	1	2	3 4	5 6	7 8
OPERATING MODE		8087	RAM	monitor	drive #
	normal off	no 8087 on	128K off on	none on on	1 on on
		with 8087 off	192K on off	40x25 colour off on	2 off on
			256K off off	80x25 colour on off	3 on off
				monochrome off off	4 off off

ROM BIOS DECODER (SW2, SW3, and JP1)

EPROM/ROM SELECTION												
	SW3								SW2			
switch no	1	2	3	4	5	6	7	8	1	2	3	4
2764 EPROM	on	off	on	off	on	off	on	off	off	on	off	on
27128 EPROM	on	off	off	on	on	off	on	off	on	off	off	on
8Kx8 ROM	on	off	on	off	off	on	off	on	off	on	off	on
32Kx8 ROM	off	on	off	on	on	off	on	off	on	off	on	off

For 2764 EPROM or 8K x 8 ROM strap across 1,2,3 @ JP1

SUPER XT MOTHERBOARD: Features include: 8088 MPU with socket for optional 8087 co-processor; eight I/O expansion slots, XT spacing of 20 mm; on-board memory in blocks of 64 K to a maximum of 256 K using 4164 or equivalent RAM chips; eight ROM sockets; documentaion and schematics available from supplier.



actual size
30.3 cm x 21.6 cm
(layout is reduced)

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SUPER XT MOTHERBOARD (continued)

DIODE D *Position banded (cathode) end of diode towards the arrow

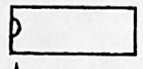
____ 1 - 1N4148 @ CR1

RESISTORS R ¼ watt, 5%

____ 3 - 27 Ω @ R3,4,5
____ 2 - 510 Ω @ R1,2
____ 1 - 1 KΩ @ R7
____ 1 - 1 MΩ @ R6
____ 4 - 4.7 KΩ 10-pin SIP* @ Z1,2,3,4
*Match pin 1 of SIPs with pin 1 on the layout
____ 2 - 33 Ω 16-pin DIP* @ U63,78
*Solder directly to the board
*Sixteen 33 Ω resistors may be substituted

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____20 - 14-pin
____47 - 16-pin
____ 1 - 18-pin
____15 - 20-pin
____ 1 - 24-pin
____ 9 - 28-pin
____ 4 - 40-pin



CAPACITORS C

____ 3 - 50 pF
____ 1 - 0.01 µF @ C19
____63 - 0.1 µF Monolithic* @
*Note TWO different spacings between solder pads. Select CORRECT PADS
____14 - 10 µF/25V Tantalum* @ C2,3,4, C5,6,10,11,12,13,14,15,16, C17,18 *Match + of caps with + on the layout
____ 1 - 5-50 pF Trimcap @ C1

TRANSISTOR Q *Position EBC leads as shown

____ 1 - 2N3904 @ n3904

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

CRYSTAL Y *Fold crystal flat against the board before sodldering. Solder the case to the grounding pads at sides

____ 1 - 14.31818 MHz @ Y1

SWITCHES

____ 1 - 8-position DIP @ SW1
selects system configuration

*The following TWO switches (W) select EPROM/ROM type. Install one 74LS138 IC at A,B, or C of U23 accordingly

____ 1 - 8-position DIP @ W1 to W8
____ 1 - 4-position DIP @ W9 to W12

CONNECTORS

____ 1 - 1x3 header, male, straight @ JP1
____ 1 - 1x4 header, male, straight @ P4
____ 1 - 12-pin power connector @ P1,P2
____ 1 - 6-pin power connector @ P3
*for Apple-type power supply
____ 8 - 62-pin card edge connectors @ J1,2,3,4,5,6,7,8
____ 1 - 5-pin DIN Keyboard connector @ PC or XT

DELAY LINE

____ 1 - 100 ns @ U95 Solder to the board

VOLTAGE REGULATOR *Install only if power supply lacks -5 V

____ 1 - 7905 5V negative regulator

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U85
____ 2 - 74LS02 @ U24,97
____ 3 - 74LS04 @ U18.67,100
____ 1 - 74LS10 @ U84
____ 2 - 74LS20 @ U12,66
____ 1 - 74LS27 @ U17
____ 1 - 74LS32 @ U50
____ 2 - 74LS74 @ U52,82
____ 3 - 74LS138 @ U23,51,81
____ 2 - 74LS175 @ U27,83
____ 6 - 74LS244 @ U6,9,10,11,16,21
____ 4 - 74LS245 @ U2,13,14,22
____ 1 - 74LS322 @ U53
____ 3 - 74LS373 @ U5,7,15
____ 1 - 74LS670 @ U26

____ 2 - 74S00 @ U96,99
____ 2 - 74S08 @ U79,98
____ 1 - 74S74 @ U65
____ 1 - 74S138 @ U80
____ 2 - 74S157 @ U47,64
____ 1 - 74S280 @ U25

____ 1 - 7407 @ U19

____ 1 - 8088 @ U3 MPU
____ 1 - 8087 @ U4 (optional)
____ 1 - 8237A-5 @ U36
____ 1 - 8253-5 @ U49
____ 1 - 8255A-5 @ U37
____ 1 - 8259A @ U48
____ 1 - 8284A @ U1
____ 1 - 8288 @ U8

____18 - 4164 DRAM 200 ns (standard) @ bank Ø & bank 1
____18 - 4164 DRAM 200 ns (optional) @ bank 2 & bank 3
____ 1 - 2764 Boot EPROM 250ns @ ROM 7
____ 7 - 2764 EPROM (optional) @ ROM Ø,1,2,3,4,5,6

SUPER XT MOTHERBOARD: (continued)

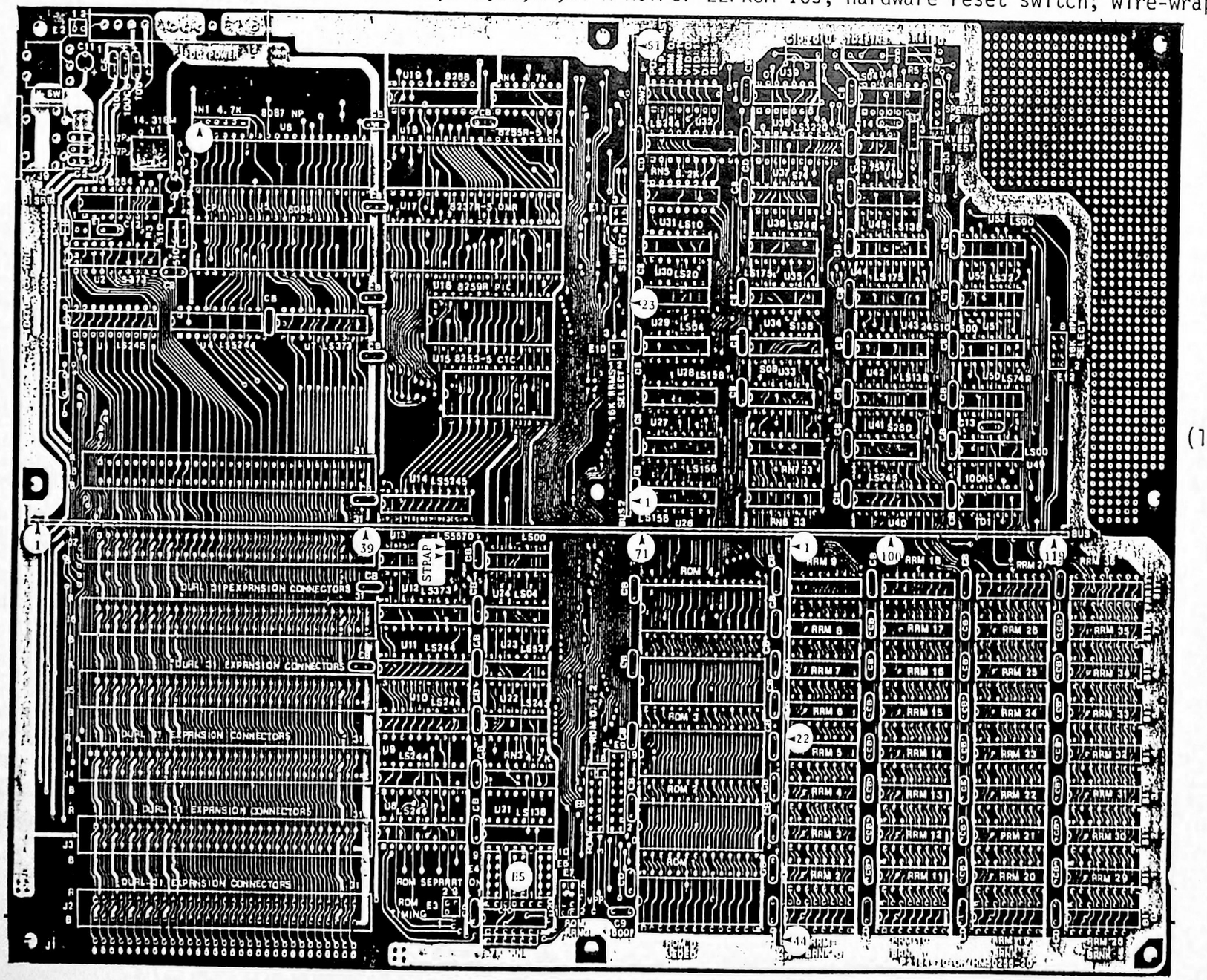
SWITCH SW1 SETTINGS: SYSTEM CONFIGURATION

SWITCH #	1	2	3 4	5 6	7 8
OPERATING MODE		8087	RAM	monitor	drive #
	normal off	no 8087 on	128K off on	none on on	1 on on
		with 8087 off	192K on off	40x25 colour off on	2 off on
			256K off off	80x25 colour on off	3 on off
				monochrome off off	4 off off

EPROM/ROM SELECTION (SWITCHES W): LOCATION OF MEMORY DECODER (U23, 74LS138)

EPROM/ROM SELECTION													LOCATION OF U23
	W - near ROM 7								W - near U12				
W number	1	2	3	4	5	6	7	8	9	10	11	12	position
2764 EPROM	on	off	on	off	on	off	on	off	off	on	off	on	A
27128 EPROM	on	off	off	on	on	off	on	off	on	off	off	on	B
8Kx8 ROM	on	off	on	off	off	on	off	on	off	on	off	on	A
32Kx8 ROM	off	on	off	on	on	off	on	off	on	off	on	off	C

ECS-7 GRANDE MOTHERBOARD: Features include: 8088 MPU with socket for optional 8087 co-processor; eight I/O expansion slots, XT spacing of 20 mm (J1 allows for bus expansion via a 2 x 31 header); on board memory in blocks of 64 K to a maximum of 256 K using 4164 or equivalent chips, or to a maximum of 1 M using 256 K RAM chips; five ROM sockets jumper programmable to accept 8,16,32,64 K ROM or EEPROM ICs; hardware reset switch; wire-wrap area.



actual size
344 x 268 mm
(layout is reduced)

*Not ALL bus bar pins are shown!

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ECS-7 GRANDE MOTHERBOARD (continued)

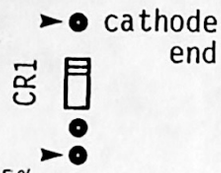
SUGGESTED SEQUENCE *INDICATES A PRECAUTION *MODIFICATION REQUIRED

*MODIFICATION ON THE SOLDER SIDE
Strap pin 9 of U13 to the feed-thru hole directly below as shown on the layout. Altho the mod is shown on the COMPONENT SIDE, the strapping should be done on the SOLDER SIDE.

Use the bare board as a guide to prepare the three bus bars. Install later.

DIODE D *Position banded (cathode) end of diode as shown

____ 1 - 1N4148 @ CR1



RESISITORS R ¼ watt, 5%

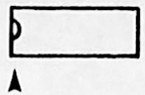
____ 1 - 33 Ω @ R7 ½ watt
____ 1 - 100 Ω @ R1
____ 1 - 180 Ω @ R6
____ 1 - 220 Ω @ R5
____ 2 - 510 Ω @ R3,4 *ONLY 33Ω DIP
____ 1 - 100 KΩ R2 IS ISOLATED
____ 2 - 4.7 KΩ 6-pin SIP* @ RN1,2
*Match pin 1 of SIPs with pin 1 on the layout

*Solder the following DIP resistor networks to the board. Single resistors may be substituted - solder these directly to the board

____ 2 - 33 Ω 16-pin DIP @ RN6,7
____ 2 - 4.7 KΩ 16-pin DIP @ RN3,4
____ 1 - 8.2 KΩ 16-pin DIP @ RN5

SOCKETS *Match pin 1 of sockets with pin 1 (square pad) on the layout. Check that ALL pins have passed thru ALL holes before soldering

____ 1 - 8-pin
____ 21 - 14-pin
____ 53 - 16-pin
____ 1 - 18-pin
____ 14 - 20-pin
____ 1 - 24-pin
____ 6 - 28-pin
____ 4 - 40-pin



CAPACITORS C

____ 3 - 47 pF Monolithic @ C2,3,4
____ 1 - 100 pF Monolithic @ C13
____ 1 - 5600 pF Monolithic @ C9
____ 1 - 0.01 µF Mylar, Axial @ C10
____ 78 - 0.1 µF Monolithic @ C12,14,CB
____ 14 - 10 µF/16V Tantalum* @ C1,5,6,7,11 and positions CD *Match + with + on the layout
____ 1 - 6-30 pF Trimcap @ C8

CRYSTAL Y *Fold crystal flat against the board before soldering. Solder the case to the grounding pads

____ 1 - 14.31818 MHz @ Y1

SWITCH

____ 1 - Minature PB, momentary contact @ SW1
____ 1 - 8-position DIP @ SW2

BUS BARS ten pins per inch
Prepare in the following manner: Cut bus bars to length. Mark pins to be used with a felt pen. Remove unused pins with needle nosed pliers. Check that tabs are cleanly removed & cannot cause shorts with bus bar installed. Install & solder.

____ BUS 1 - 30 cm. Use pins 1,7,10,19,39, 51,59,71,83,87,88,100,107,119
____ BUS 2 - 12.9 cm. Use pins 1,7,17,23, 39,51
____ BUS 3 - 11.1 cm. Use pins 1,2,4,10,22, 28,32,36,40,44

HEADERS All are male straight

____ 2 - 1x2 pins @ E2,3
____ 3 - 2x5 pins @ E4,5,6
____ 1 - 2x4 pins @ E7
____ 1 - 2x7 pins @ E8 NON-STANDARD* remove pin 14 before installing
____ 1 - 2x9 pins @ E9 NON-STANDARD* add one pin at 13

____ 1 - 1 pin @ VPP
____ 1 - 1x4 pins @ P2 Use pins 1 & 4

CONNECTORS

____ 1 - 12-pin Molex @ P1

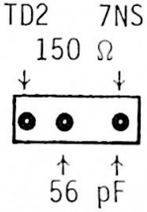
PINOUT FOR POWER

pin	for
1	reset
2	key
3	+12
4	-12
5,6,7,8	GND
9	-5
10,11,12	+5

____ 1 - 5-pin DIN, 90°
____ 7 - 62-pin card edge-connectors
____ 1 - 2x31 header, male, straight @ J1 for bus expansion

DELAY LINE *Solder directly to the board

____ 1 - 100 ns digital @ TD1 in socket
____ 1 - 7 ns inductive @ TD2*
*TD2 required only for 256 K RAM chips. Otherwise substitute a 150 Ω resistor and a 56 pF cap as shown below



ECS-7 GRANDE MOTHERBOARD (continued)

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 3 - 74LS00 @ U25,49,53
____ 3 - 74LS04 @ U24,29,48
____ 1 - 74LS10 @ U31
____ 1 - 74LS20 @ U30
____ 1 - 74LS27 @ U23
____ 1 - 74LS30 @ U20
____ 1 - 74LS32 @ U52
____ 2 - 74LS74 @ U36,50
____ 3 - 74LS138 @ U21,42,45
____ 3 - 74LS158 @ U26,27,28†
____ 2 - 74LS175 @ U35,44
____ 1 - 74LS243 @ U22
____ 6 - 74LS244 @ U4,8,9,10,11,32
____ 3 - 74LS245 @ U1,14,40
____ 1 - 74LS322A @ U38
____ 3 - 74LS373 @ U2,7,12
____ 1 - 74LS670 @ U13

____ 1 - 74S00 @ U51
____ 2 - 74S08 @ U33,46
____ 1 - 74S74 @ U37
____ 1 - 74S138 @ U34
____ 1 - 74S280 @ U41

____ 1 - 7407 @ U39
____ 1 - 75477 @ U47

____ 1 - 8087 @ U6 (optional)
____ 1 - 8088 @ U5 MPU
____ 1 - 8237A-5 @ U17
____ 1 - 8253-5 @ U15
____ 1 - 8255A-5 @ U18
____ 1 - 8259A @ U16
____ 1 - 8284 @ U3
____ 1 - 8288 @ U19

†Equip U28 only when using 256 K RAM chips

INTEGRATED CIRCUITS (continued)

____ 1 - 24S10 (TI) 256x4 bipolar PROM @ U43
____ 1 - 2764 Boot EPROM @ ROM 4
____ 4 - 2764 EPROMs @ ROM Ø,1,2,3
____ 9 - 4164 64K bit DRAM 200 ns @ BANK 0
____27 - 4164 64K bit DRAM 200 ns @ BANK 1,2,3 (optional)

STRAPPING Refer to documentation for a detailed description

*Terminal numbering on E8 & E9 is non-standard, especially terminals 13,14,15

FOR ROM DISABLE:
E1 not equipped

FOR POWER RESET
E2 equip only if power supply provides pin 1 reset

FOR 64 K EPROMs (2764)

location	strap
E3	1-2
E4,5,6	7-8
E7	3-4
	5-6
	7-8
E8	1-3
	5-6
	8-10
	11-12
E9	1-2
	5-7
	10-12
	14-15
	18-19

STRAPPING (continued)

FOR 64 K DRAM
E10,11,12 not equipped

FOR KEYBOARD TEST
E13 not equipped

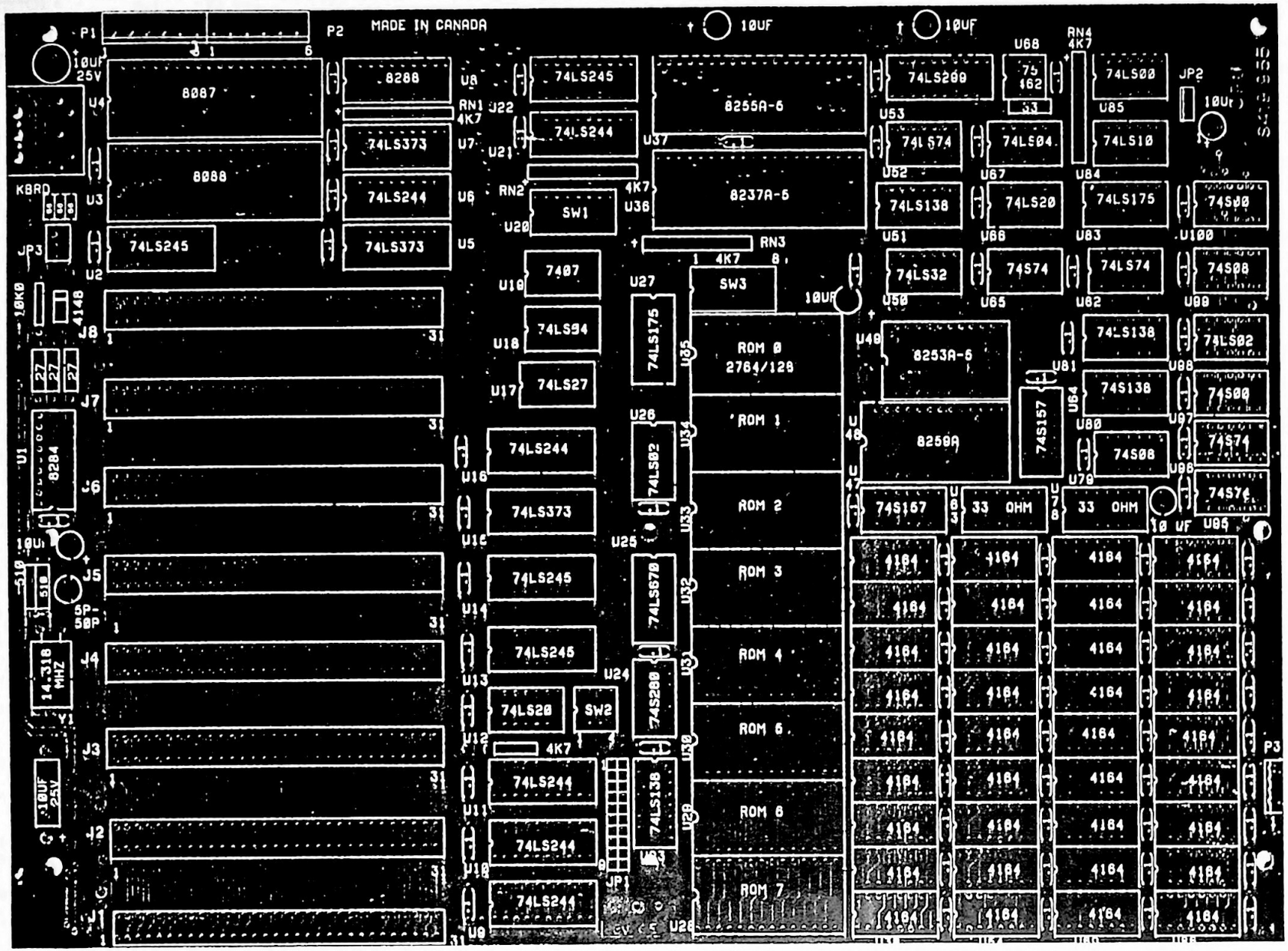
ROMs:

location	starting address	function
ROM Ø	F6ØØ	4th BASIC ROM
ROM 1	F8ØØ	3rd BASIC ROM
ROM 2	FAØØ	2nd BASIC ROM
ROM 3	FCØØ	1st BASIC ROM
ROM 4	FEØØ	boot ROM

SWITCH SW2 SETTINGS: SYSTEM CONFIGURATION

SWITCH #	1	2	3 4	5 6	7 8
OPERATING MODE		8087	RAM	monitor	drive #
	normal off	no 8087 on	128K off on	none on on	1 on on
		with 8087 off	192K on off	40x25 colour off on	2 off on
			256K off off	80x25 colour on off	3 on off
				monochrome off off	4 off off

PRESTIGE II XT MOTHERBOARD: Features include: 8088 MPU with socket for optional 8087 co-processor; eight expansion slots, XT spacing of 20 mm; on-board memory in blocks of 64 K to a maximum of 256 K using 4164 or equivalent RAM chips; eight ROM sockets. Documentaion and schematics are available from supplier.



actual size
30.3 x 21.6 cm
(layout is reduced)

PRESTIGE II XT MOTHERBOARD (cont)

DIODE D *Position banded (cathode) end of diode towards the band on the layout

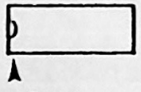
____ 1 - 1N4148 @ 4148

RESISTORS R ¼ watt, 5%

____ 3 - 27 Ω
____ 1 - 33 Ω
____ 2 - 510 Ω
____ 1 - 4.7 KΩ
____ 1 - 10 KΩ
____ 4 - 4.7 KΩ 10-pin SIP @ RN1,2,3,4
*Match pin 1 of SIPs with pin 1 (+) on the layout
____ 2 - 33 Ω 16-pin DIP @ U63,78
*Solder directly to the board
*Sixteen 33 Ω resistors may be substituted at U63,78

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____21 - 14-pin
____47 - 16-pin
____ 1 - 18-pin
____15 - 20-pin
____ 1 - 24-pin
____ 9 - 28-pin
____ 4 - 40-pin



CAPACITORS C

____ 3 - 56 pF
____75 - 0.1 µF Monolithic @ .1
____ 1 - 5-50 pF Trimcap
*Match + of the following caps with + on the layout
____ 1 - 10 µF/25V Axial*
____ 7 - 10 µF/25V Tantalum* @ +

CRYSTAL *Fold crystal flat against the board before soldering. Solder the case to the grounding pads

____ 1 - 14.31818 MHz @ Y1

SUGGESTED SEQUENCE *INDICATES A PRECAUTION *MODIFICATION REQUIRED

SWITCHES SW

____ 1 - 4-position DIP @ SW2
____ 1 - 8-position DIP @ SW1,3

CONNECTORS

____ 1 - 2x9 header, male, straight @ JP1
____ 1 - 1x3 header, male, straight @ JP2
____ 1 - 1x4 header, male, straight @ P3
____ 1 - 12-pin power connector @ P1,P2
____ 8 - 62-pin card edge connectors @ J1,2,3,4,5,6,7,8
____ 1 - 5-pin DIN Keyboard connector @ KBRD

POWER PINOUT

	pin #	for
P1	1	power good
	2	key
	3	+12
	4	-12
	5,6	GND
P2	1,2	GND
	3	-5
	4,5,6	+5

STRAP upper two pins of JP2

STRAP JP3 as shown

INTEGRATED CIRCUITS *Match pin 1 of IC with pin 1 on the layout

____ 1 - 74LS00 @ U85
____ 2 - 74LS02 @ U26,98
____ 2 - 74LS04 @ U18,67
____ 1 - 74LS08 @ U99
____ 1 - 74LS10 @ U84
____ 2 - 74LS20 @ U12,66
____ 1 - 74LS27 @ U17
____ 1 - 74LS32 @ U50
____ 2 - 74LS74 @ U52,82
____ 3 - 74LS138 @ U23,51,81
____ 2 - 74LS175 @ U27,83
____ 6 - 74LS244 @ U6,9,10,11,16,21(SIG)
____ 4 - 74LS245 @ U2,13,14,22
____ 1 - 74LS299 @ U53
____ 3 - 74LS373 @ U5,7,15
____ 1 - 74LS670 @ U25

____ 2 - 74S00 @ U97,100
____ 1 - 74S08 @ U79
____ 3 - 74S74 @ U65,95,96
____ 1 - 74S138 @ U80
____ 2 - 74S157 @ U47,64
____ 1 - 74S280 @ U24

____ 1 - 7407 @ U19
____ 1 - 75462 @ U68

____ 1 - 8088 @ U3 MPU
____ 1 - 8087 @ U4 (optional)
____ 1 - 8237A-5 @ U36
____ 1 - 8253-5 @ U49
____ 1 - 8255A-5 @ U37
____ 1 - 8259A @ U48
____ 1 - 8284A @ U1
____ 1 - 8288 @ U8

____18 - 4164 DRAM 150 ns standard @ U38-46 & U54-62
____18 - 4164 DRAM 150 ns (optional) @ U69-77 & U86-94
____ 1 - 2764 Boot EPROM 250 ns @ U35
____ 7 - 2764 EPROMs 250 ns @ U28,29,30,31,32,33,34

PRESTIGE II XT MOTHERBOARD (continued)

SWITCH SW1 SETTINGS: SYSTEM CONFIGURATION

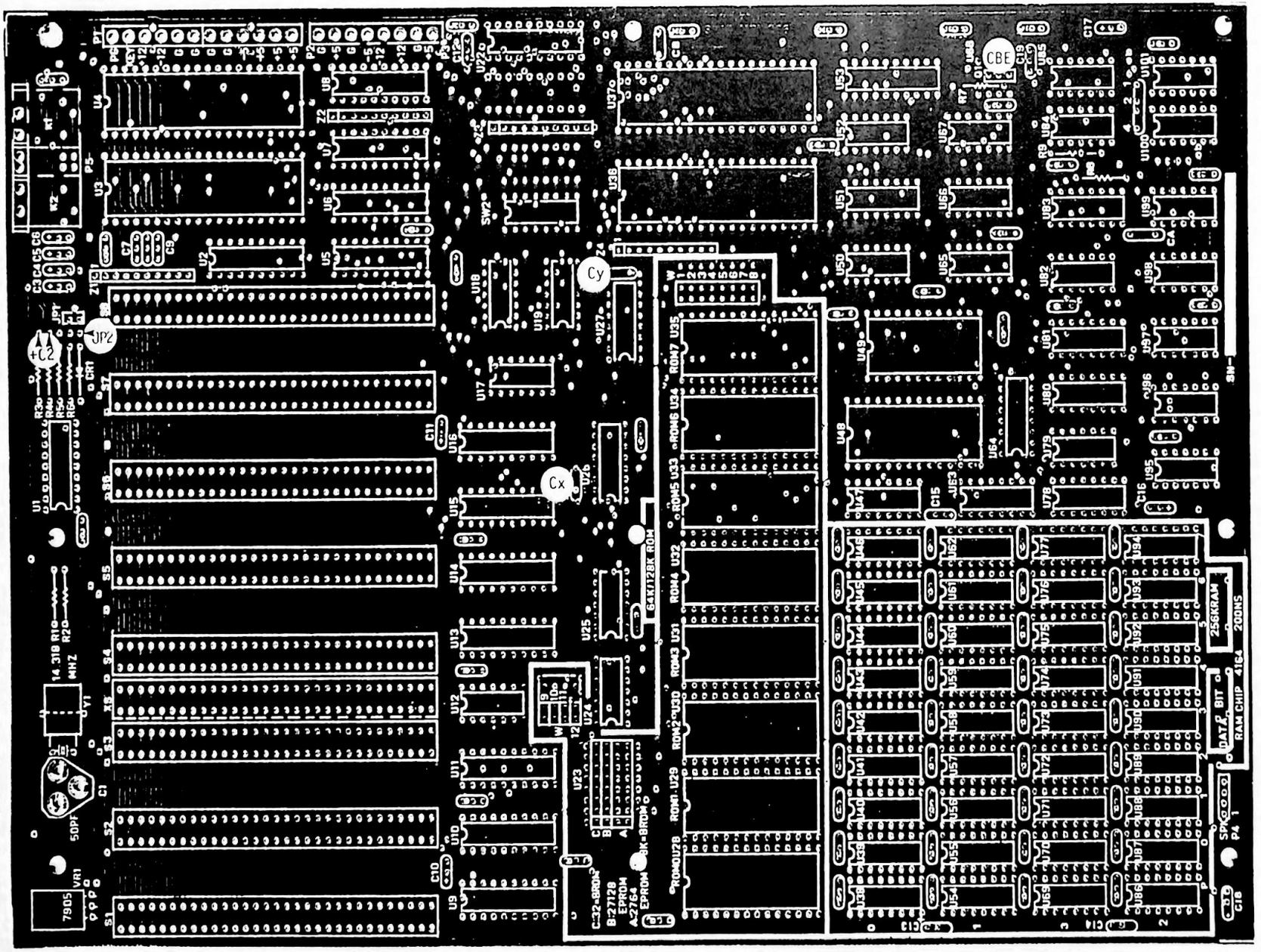
SWITCH #	1	2	3 4	5 6	7 8
OPERATING MODE		8087	RAM	monitor	drive #
	normal off	no 8087 on	128K off on	none on on	1 on on
		with 8087 off	192K on off	40x25 colour off on	2 off on
			256K off off	80x25 colour on off	3 on off
				monochrome off off	4 off off

ROM BIOS DECODER (SW2, SW3, and JP1)

EPROM/ROM SELECTION												
	SW3								SW2			
switch no	1	2	3	4	5	6	7	8	1	2	3	4
2764 EPROM	on	off	on	off	on	off	on	off	off	on	off	on
27128 EPROM	on	off	off	on	on	off	on	off	on	off	off	on
8Kx8 ROM	on	off	on	off	off	on	off	on	off	on	off	on
32Kx8 ROM	off	on	off	on	on	off	on	off	on	off	on	off

For 2764 EPROM or 8K x 8 ROM strap across 1,2,3 @ JP1

PERFECT-SUPER XT MOTHERBOARD: Features include: 8088 MPU with socket for optional 8087 co-processor; eight I/O expansion slots, XT spacing of 20 mm; on-board memory in blocks of 64 K to a maximum of 256 K using 4164 or equivalent chips; eight ROM sockets.



actual size
30.6 cm x 22.0 cm
(layout is reduced)

NuScope Associates

PERFECT-SUPER XT (continued)

DIODE D *Position banded end (cathode) of diode towards the arrow

____ 1 - 1N4148 @ CR1

RESISTORS R ¼ watt, 5%
*R8,9 are not equipped

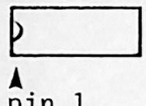
____ 3 - 27 Ω @ R3,4,5
____ 2 - 510 Ω @ R1,2
____ 1 - 1.0 KΩ @ R7
____ 1 - 12 KΩ @ R6

*Match pin 1 of SIPs with pin 1 (square) on the layout

____ 4 - 4.7 KΩ 10-pin SIP @ Z1,2,3,4
____ 2 - 33 Ω 16-pin DIP* @ U63,78
*Solder directly to the board Sixteen single 33Ω resistors may be substituted for DIPs

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____21 - 14-pin
____45 - 16-pin
____ 1 - 18-pin
____15 - 20-pin
____ 1 - 24-pin
____ 9 - 28-pin
____ 4 - 40-pin



CAPACITORS C *Cx & Cy are not equipped

____ 3 - 47 pF @ C7,8,9
____ 2 - 300 pF @ CA,CB
____ 1 - 0.022 µF @ C19
____64 - 0.1 µF Monolithic* @ white dot
*Note TWO different spacings between solder pads. Select the CORRECT PADS
____14 - 10 µF/16V Axials* @ C2,3,4,5,6 C10,11,12,13,14,15,16,17 C18 *Match + of Axial with + on the layout
____ 1 - 5-50 pF Trimcap @ C1

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

CRYSTAL Y *Fold crystal flat against the board before soldering. Solder the case to the two grounding pads

____ 1 - 14.31818 MHz @ Y1

TRANSISTOR Q *Position EBC leads as shown

____ 1 - 2N3904 @ Q1

SWITCHES

____ 1 - 8-position DIP @ SW2
Selects system configuration

NOTE OPTION @ W1-8 & W9-12
Use either

____ 1 - 8-position DIP @ W1-8
____ 1 - 4-position DIP @ W9-12

or

____ 1 - 2x8 headed, male, straight @ W1-8
____ 1 - 2x4 header, male, straight @ W9-12
____ - - jumper plugs

CONNECTORS

____ 1 - 1x2 header, male straight @ JP1
____ 1 - 1x3 header, male straight @ JP2
____ 1 - 1x4 header, male 90° @ P4
____ 1 - 12-pin power connector @ P1,2
____ 1 - 6-pin power connector @ P3
(for optional Apple-type supply)
____ 8 - 62-pin card edge connector @ S1 to 8
____ 1 - 5-pin DIN keyboard connector @ P5

VOLTAGE REGULATOR *Install only if power supply lacks -5V

____ 1 - 7905 5V negative regulator

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U85
____ 2 - 74LS02 @ U24,97
____ 4 - 74LS04 @ U18,67,95,100
____ 2 - 74LS08 @ U79,98
____ 1 - 74LS14 @ U101
____ 2 - 74LS20 @ U12,66
____ 1 - 74LS27 @ U17
____ 1 - 74LS32 @ U50
____ 2 - 74LS74 @ U52,82
____ 3 - 74LS138 @ U23,51,81
____ 1 - 74LS175 @ U83
____ 5 - 74LS244 @ U6,9,10,11,16
____ 4 - 74LS245 @ U2,13,14,53
____ 1 - 74LS322 @ U22
____ 3 - 74LS373 @ U5,7,15
____ 1 - 74LS670 @ U26
____ 1 - 74LS10 @ U84

____ 1 - 7407 @ U19

____ 2 - 74S00 @ U96,99
____ 1 - 74S74 @ U65
____ 1 - 74S138 @ U80
____ 2 - 74S157 @ U47,64
____ 1 - 74S175 @ U27
____ 1 - 74S280 @ U25

____ 1 - 8088 @ U3
____ 1 - 8087 @ U4 (optional)
____ 1 - 8237A-5 @ U36
____ 1 - 8253-5 @ U49
____ 1 - 8255A-5 @ U37
____ 1 - 8259A @ U48 *NOT 8259C-5
____ 1 - 8284A @ U1
____ 1 - 8288 @ U8

____36 - 4164 DRAM 200 ns @ U38-46,54-62,69-77,86-94
____ 1 - 2764 Boot EPROM 250 ns @ U35
____ 7 - 2764 optional @ U28-34

PERFECT-SUPER XT (continued)

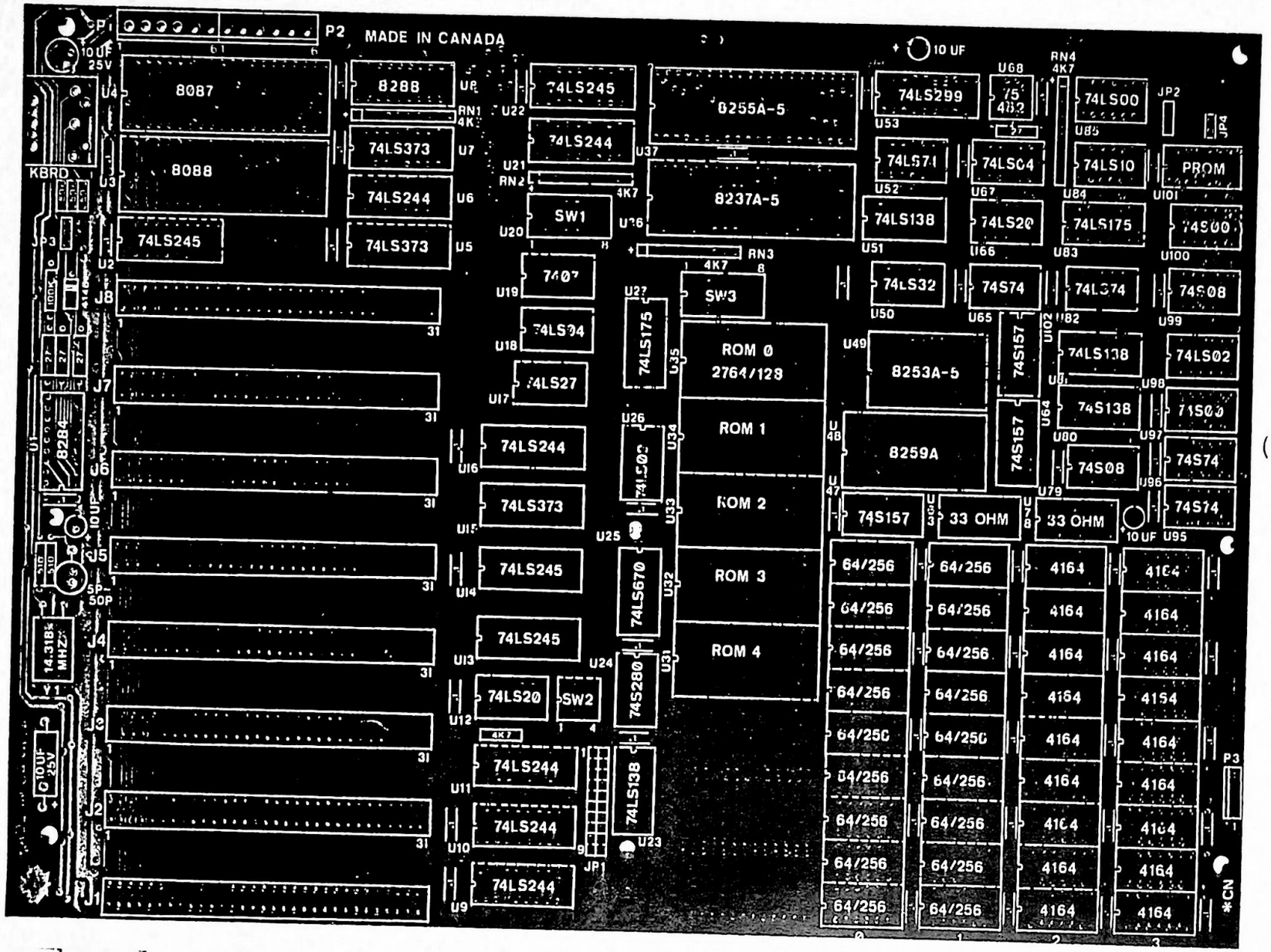
SWITCH SW2 SETTINGS: SYSTEM CONFIGURATION

SWITCH #	1	2	3 4	5 6	7 8
OPERATING MODE	normal off	8087 no 8087 on with 8087 off	RAM 128K off on 192K on off 256K off off	monitor none on on 40x25 colour off on 80x25 colour on off monochrome off off	drive # 1 on on 2 off on 3 on off 4 off off

EPROM/ROM SELECTION AND LOCATION OF MEMORY DECODER (U23 74LS138):

EPROM/ROM SELECTION													LOCATION OF U23
	W - near ROM 7								W - near U12				
W number	1	2	3	4	5	6	7	8	9	10	11	12	position
2764 EPROM	on	off	on	off	on	off	on	off	off	on	off	on	A
27128 EPROM	on	off	off	on	on	off	on	off	on	off	off	on	B
8Kx8 ROM	on	off	on	off	off	on	off	on	off	on	off	on	A
32Kx8 ROM	off	on	off	on	on	off	on	off	on	off	on	off	C

PRELUDE 640 K MOTHERBOARD: Features include: 8088 MPU with socket for optional 8087 co-processor; eight expansion slots, XT spacing of 20 mm; on-board memoryof either a) 256 K bytes using 4164 ICs or b) 640 K bytes using two banks (Ø,1) of 41256 ICs and two banks (2,3) of 4164 ICs with J4 strapped; eight ROM sockets. Documentation and schematics available from the supplier. Firmware required (one PROM) when used as a 640 K board.



actual size
30.5 cm x 21.6 cm
(layout is reduced)

NuScope Associates

PRELUDE 640 K MOTHERBOARD (continued)

DIODES D *Position banded end (cathode) of diode towards the band on the layout

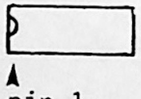
____ 1 - 1N4148

RESISTORS R ¼ watt, 5%

____ 4 - 27 Ω
____ 2 - 510 Ω
____ 1 - 4.7 KΩ
____ 1 - 100 KΩ
____ 4 - 4.7 KΩ 10-pin SIP* bussed @ RN1,2,3,4 *Match pin 1 of SIPs with pin 1 (+) on layout
____ 2 - 33 Ω 16-pin DIP @ U63,78 *Solder directly to the board. Sixteen 33 Ω resistors may be substituted @ U63,78

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 1 - 8-pin
____21 - 14-pin
____49 - 16-pin
____ 1 - 18-pin
____15 - 20-pin
____ 1 - 24-pin
____ 9 - 28-pin
____ 4 - 40-pin



CAPACITORS C

____ 3 - 50 pF
____49 - 0.1 µF Monolithic @ .1
____ 1 - 50 pF Trimcap

*Match + of the following capacitors with + on the layout

____ 1 - 10 µF/25V Axial*
____ 4 - 10 µF/25V Tantalum* @

CRYSTAL * Fold XAL flat against the board before soldering. Solder the case to the grounding pads

____ 1 - 14.31818 @ Y1

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

SWITCHES SW

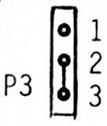
*SW2 & SW3 are not equipped. Board is configured for 2764 EPROMs

____ 1 - 8-positon DIP @ SW1

CONNECTORS

*JP1, JP2, JP3 are not equipped

*Cut trace between pins 2 & 3 of JP3 when using "power good" original power supply Strap pins 1 &2



____ 1 - 1x2 header, male, straight @ JP4 *Strap JP4 for 640 K bytes
____ 1 - 1x4 header, male, straight @ P3, speaker
____ 1 - 12-pin power connector @ P1,2
____ 8 - 62-pin card edge connectors @ J1,2,3,4,5,6,7,8
____ 1 - 5-pin DIN keyboard connector @ KBRD

POWER PINOUT

	pin #	for
P1	1	power good
	2	key
	3	+12
	4	-12
	5,6	GND
P2	1,2	GND
	3	-5
	4,5,6	+5

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U85
____ 2 - 74LS02 @ U26,98
____ 2 - 74LS04 @ U18,67
____ 1 - 74LS08 @ U99
____ 1 - 74LS10 @ U84

INTEGRATED CIRCUITS (continued)

____ 2 - 74LS20 @ U12,66
____ 1 - 74LS27 @ U17
____ 1 - 74LS32 @ U50
____ 2 - 74LS74 @ U52,82
____ 3 - 74LS138 @ U23,51,81
____ 2 - 74LS175 @ U27,83
____ 6 - 74LS244 @ U6,9,10,11,16,21 (SIG)
____ 4 - 74LS245 @ U2,13,14,22
____ 1 - 74LS299 @ U53
____ 3 - 74LS373 @ U5,7,15
____ 1 - 74LS670 @ U25

____ 2 - 74S00 @ U97,100
____ 1 - 74S08 @ U79
____ 3 - 74LS74 @ U65,95,96
____ 1 - 74S138 @ U80
____ 3 - 74S157 @ U47,64,102
____ 1 - 74S280 @ U24

____ 1 - 7407 @ U19
____ 1 - 75462 @ U68

____ 1 - 8088 @ U3 MPU
____ 1 - 8087 @ U4 (optional)
____ 1 - 8237A-5 @ U36
____ 1 - 8253-5 @ U49
____ 1 - 8255A-5 @ U37
____ 1 - 8259A @ U48
____ 1 - 8284A @ U1
____ 1 - 8288 @ U8

____ 1 - 24S10 @ U101 PROM
____ 1 - 2764 250 ns BOOT EPROM @ U35
____ 7 - 2764 250 ns EPROMs @ U28,29,30,31,32,33,34
____36 - 4164 RAM 150 ns @ BANK Ø,1,2,3 for 256 K on the board

For 640 K on the board: *Strap JP4

____18 - 41256 RAM 150 ns @ BANK Ø,1
____18 - 4164 RAM 150 ns @ BANK 2,3

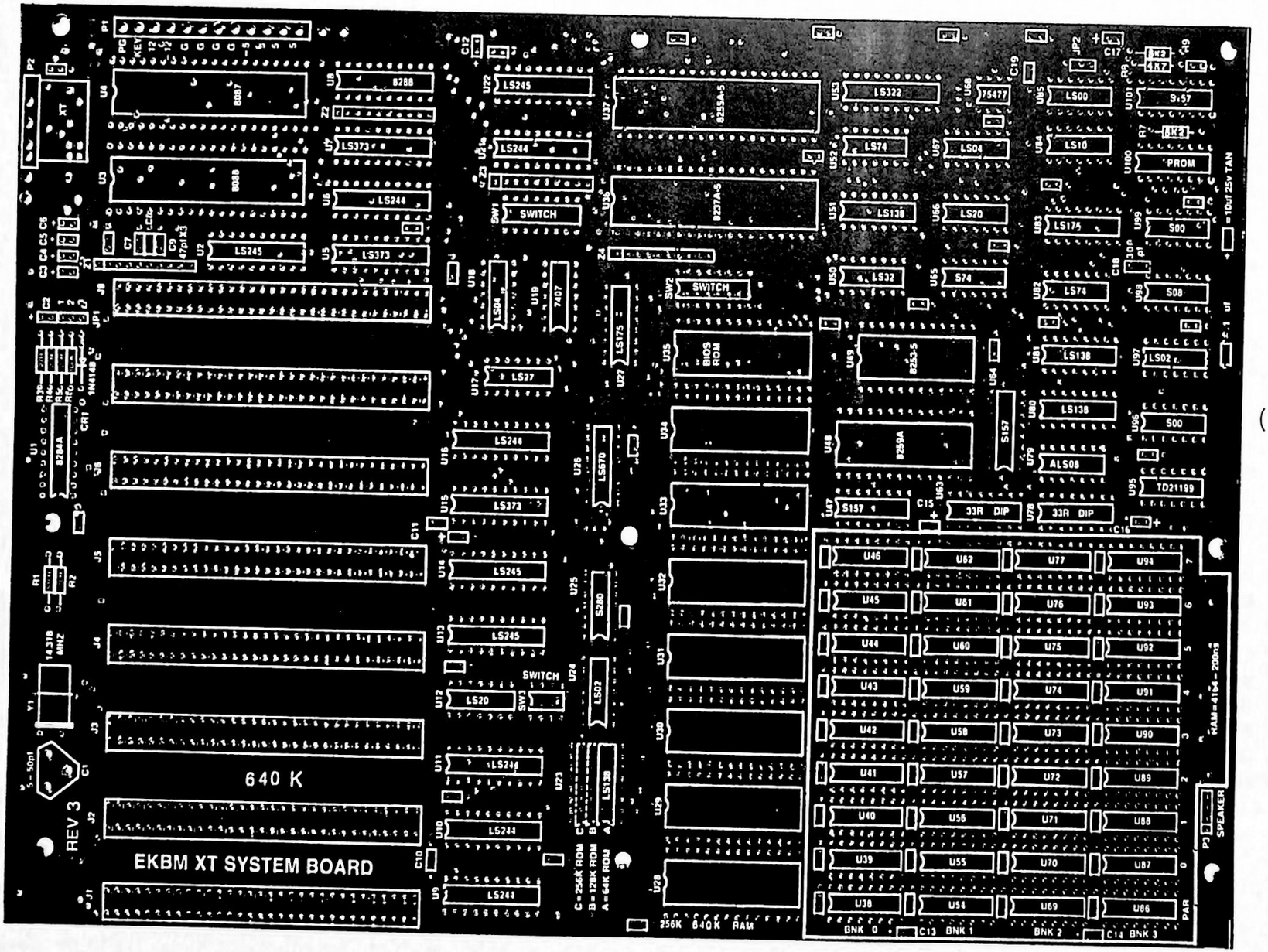
PRELUDE 640 K MOTHERBOARD (continued)

SWITCH SW1 SETTINGS: SYSTEM CONFIGURATION

SWITCH #	1	2	3 4	5 6	7 8
OPERATING MODE		8087	RAM	monitor	drive #
	normal off	no 8087 on	128K off on	none on on	1 on on
		with 8087 off	192K on off	40x25 colour off on	2 off on
			256K off off	80x25 colour on off	3 on off
			640K off off	monochrome off off	4 off off

GUIDE XTE-2

EKBM 640 K MOTHERBOARD: Features include: 8088 MPU with socket for optional 8087 co-processor; eight expansion slots, XT spacing of 20 mm; on-board memory of either a) 256 K bytes using 4164 ICs or b) 640 K bytes using two banks (Ø,1) of 41256 ICs and two banks (2,3) of 4164 ICs with JP2 strapped; eight ROM sockets. Documentaion available from supplier. Requires firmare (one PROM) when used as a 640 K board.



actual size
30.3 cm x 21.6 cm
(layout is reduced)

NuScope Associates

EKBM 640 K MOTHERBOARD: (continued)

DIODE D *Position banded (cathode) end of diode towards the arrow

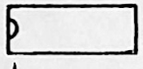
____ 1 - 1N4148

RESISTORS R ¼ watt, 5%

____ 3 - 27 Ω @ R3,4,5
____ 2 - 510 Ω @ R1,2
____ 1 - 4.7 KΩ @ R8
____ 2 - 8.2 KΩ @ R7,9
____ 1 - 100 KΩ @ R6
____ 4 - 4.7 KΩ 10-pin SIP* bussed @ Z1,2,3,4
*Match pin 1 of SIPs with pin 1 (square) on the layout
____ 2 - 33 Ω 16-pin DIP @ U63,78
*Solder DIPs directly to the board (Eight 33 Ω resistors may be substituted for each DIP

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 1 - 8-pin
____19 - 14-pin
____47 - 16-pin
____ 1 - 18-pin
____15 - 20-pin
____ 1 - 24-pin
____ 9 - 28-pin
____ 4 - 40-pin



CAPACITORS C

____ 3 - 47 pF @ C7,8,9
____ 1 - 300 pF @ C18
____65 - 0.1 µF Monolithic @
____13 - 10 µF/25V Tantalum* @ C2,3,4,5,6 C10,11,12,13,14,15,16,17
*Match + of Tantalums with + on the layout
____ 1 - 5-50 pF Trimcap @ C1

CRYSTAL Y *Fold crystal flat against the board before soldering

____ 1 - 14.31818 MHz @ Y1

SWITCHES

____ 1 - 8-position DIP @ SW1
*SW2 & SW3 are not equipped. Board is configured for 2764 EPROM

CONNECTORS

____ 1 - 1x2 header, male, straight @ JP2 *Strap for 640 K bytes
____ 1 - 1x3 header, male, straight @ JP1
____ 1 - 1x4 header, male 90° @ P3 speaker
____ 1 - 12-pin, male, Molex @ P1 for power
____ 8 - 62-pin card edge connector @ J1,2,3,4,5,6,7,8
____ 1 - 5-pin DIN, 90° @ P2 for keyboard

DELAY LINE

____ 1 - 100 ns @ U95 Soler directly to the board

POWER PINOUT

pin #	for
1	power good
2	key
3	+12
4	-12
5,6	GND
7,8	GND
9	-5
10,11,12	+5

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U85
____ 2 - 74LS02 @ U24,97
____ 2 - 74LS04 @ U18,67
____ 1 - 74LS10 @ U84
____ 2 - 74LS20 @ U12,66
____ 1 - 74LS27 @ U17

INTEGRATED CIRCUITS (continued)

____ 1 - 74LS32 @ U50
____ 2 - 74LS74 @ U52,82
____ 4 - 74LS138 @ U23,51,80,81
____ 2 - 74LS175 @ U27,83
____ 6 - 74LS244 @ U6,9,10,11,16,21
____ 4 - 74LS245 @ U2,13,14,22
____ 1 - 74LS322 @ U53
____ 3 - 74LS373 @ U5,7,15
____ 1 - 74LS670 @ U26

____ 2 - 74S00 @ U96,99
____ 2 - 74S08 @ U79,98
____ 1 - 74S74 @ U65
____ 3 - 74S157 @ U47,64,101
____ 1 - 74S280 @ U25

____ 1 - 7407 @ U19
____ 1 - 75477 @ U68

____ 1 - 8088 @ U3 MPU
____ 1 - 8087 @ U4 (optional)
____ 1 - 8237A-5 @ U36
____ 1 - 8253-5 @ U49
____ 1 - 8255A-5 @ U37
____ 1 - 8259A @ U48
____ 1 - 8284A @ U1
____ 1 - 8288 @ U8

____ 1 - 82S129 PROM @ U100
____ 1 - 2764 BOOT EPROM @ U35
____ 7 - 2764 EPROMs (optional) @ U28 to 34
____36 - RAM 200 ns @ BNK 0,1,2,3 for 256 K on board

For 640 K on board: *Strap JP2

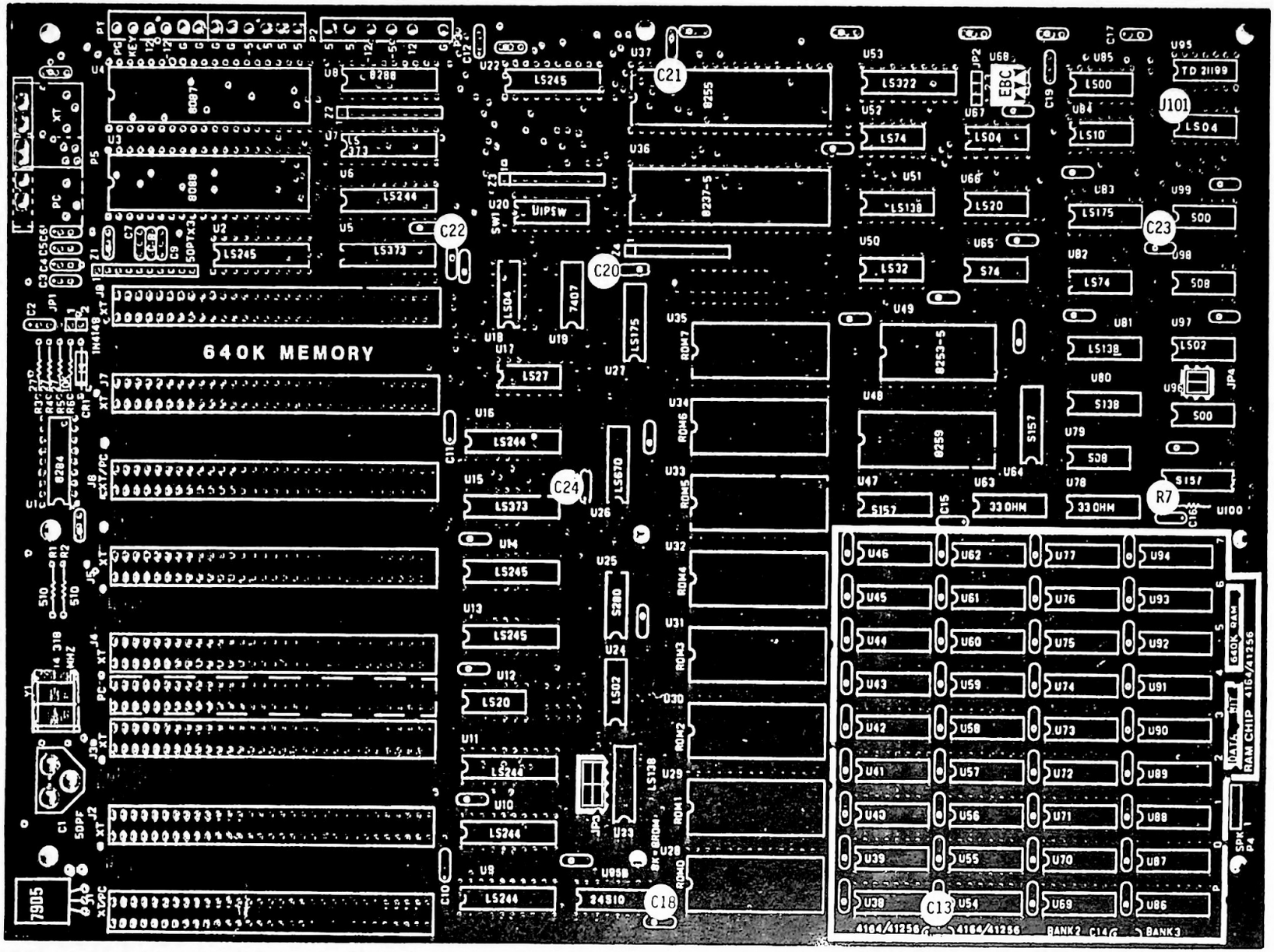
____18 - 41256 RAM @ BNK 0,1
____18 - 4164 RAM @ BNK 2,3

EKBM 640 K MOTHERBOARD (continued)

SWITCH SW1 SETTINGS: SYSTEM CONFIGURATION

SWITCH #	1	2	3 4	5 6	7 8
OPERATING MODE		8087	RAM	monitor	drive #
	normal off	no 8087 on	128K off on	none on on	1 on on
		with 8087 off	192K on off	40x25 colour off on	2 off on
			256K off off	80x25 colour on off	3 on off
			640K off off	monochrome off off	4 off off

BELTRON 640 K MOTHERBOARD: Features include: 8088 MPU with socket for optional 8087 co-processor; eight expansion slots, XT spacing of 20 mm; on-board memory of either a) 256 K bytes using 4164 ICs or b) 640 K bytes using two banks (Ø, 1) of 41256 ICs and two banks (2,3) of 4164 ICs with the correct strapping at JP and JP4; eight ROM sockets. Documentation available from the supplier. Requires firmware (one PROM) when used as a 640 K board. *PROM is not required when used as a 256 K (total) motherboard.


640K MEMORY
8088
8288
8284
8255
8237-5
8253-5
8259
LS245
LS373
LS244
LS138
LS175
LS74
LS32
LS04
LS10
LS00
LS08
LS02
LS157
LS27
LS670
LS280
LS20
74LS74
74LS04
74LS10
74LS00
74LS08
74LS02
74LS157
74LS138
74LS175
74LS32
74LS27
74LS670
74LS280
74LS20
74LS373
74LS245
74LS244
74LS138
74LS175
74LS74
74LS32
74LS27
74LS04
74LS10
74LS00
74LS08
74LS02
74LS157

BELTRON 640 K MOTHERBOARD (continued)

DIODE D *Postion banded (cathode) end of diode towards the arrow

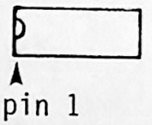
____ 1 - 1N4148 @ CR1

RESISTORS R ¼ watt, 5%

____ 3 - 27 Ω @ R3,4,5,
____ 1 - 33 Ω @ R7
____ 2 - 510 Ω @ R1,2
____ 1 - 10 KΩ @ R6
____ 4 - 4.7 KΩ 10-pin SIP* bussed @ Z1,2,3,4 *Match pin 1 of SIPs with pin 1 (square) on the layout
____ 2 - 33 Ω 16-pin DIP* @ U63,78 *Solder directly to the board Eight single 33 Ω resistors may be substituted for each DIP

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____20 - 14-pin
____47 - 16-pin
____ 1 - 18-pin
____14 - 20-pin
____ 1 - 24-pin
____ 9 - 28-pin
____ 4 - 40-pin



CAPACITORS C *C18,24 are not equipped

____ 2 - 50 pF @ C8,9
____ 1 - 68 pF @ C23
____ 1 - 100 pF @ C22
____ 1 - 330 pF @ C21
____ 1 - 470 pF @ C7
____ 1 - 0.001 µF @ C20,19
____64 - 0.1 µF Monolithic @ white dot
____ 1 - 3.3 µF/16V Tantalum* @ C2
____ 2 - 4.7 µF/16V Tantalum* @ C3,4
____10 - 10 µF/16V Tantalum* @ C5,6, C10,11,12,14,15,16,17 *Match + of Tantalums with + on the layout
____ 1 - 5-50 pF Trimcap @ C1

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

CRYSTAL Y *Fold crystal flat against the board before soldering. Solder the case to the board

____ 1 - 14.31818 MHz @ Y1

TRANSISTOR Q *Position EBC transistor leads as shown on the layout

____ 1 - 2N3904 @ Q1

SWITCH

____ 1 - 8-position DIP @ SW1 (U20) Selects system configuration

CONNECTORS *JP2 is not equipped

____ 1 - 1x2 header, male, straight @ JP1
____ 1 - 2x4 header, male, straight @ JP3
____ 1 - 1x2 header, male, straight @ JP4
____ 1 - 1x4 header, male, 90° @ P4 speaker
____ 1 - 12-pin power connector @ P1,2
____ 1 - 6-pin power connector @ P3 (optional for Apple-type supply)
____ 8 - 62-pin card edge connector @ J1 to 8
____ 1 - 5-pin DIN keyboard connector @ P5

DELAY LINE *Solder directly to the board

____ 1 - 100 ns @ U95

VOLTAGE REGULATOR *Install only if power supply lacks -5V

____ 1 - 7905 5V negative regulator

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout
*U21,68 are not equipped

____ 1 - 78LS00 @ U85
____ 2 - 74LS02 @ U24,97
____ 3 - 74LS04 @ U18,67,101
____ 1 - 74LS10 @ U84
____ 2 - 74LS20 @ U12,66
____ 1 - 74LS27 @ U17
____ 1 - 74LS32 @ U50
____ 2 - 74LS74 @ U52,82

INTEGRATED CIRCUITS (continued)

____ 3 - 74LS138 @ U23,51,81
____ 2 - 74LS175 @ U27,83
____ 5 - 74LS244 @ U6,9,10,11,16
____ 4 - 74LS245 @ U2,13,14,22
____ 1 - 74LS322 @ U53
____ 3 - 74LS373 @ U5,7,15
____ 1 - 74LS670 @ U26

____ 1 - 7407 @ U19

____ 2 - 74S00 @ U96,99
____ 2 - 74S08 @ U79,98
____ 1 - 74S74 @ U65
____ 1 - 74S138 @ U80
____ 3 - 74S157 @ U47,64,100
____ 1 - 74S280 @ U25

____ 1 - 8088 @ U3
____ 1 - 8087 @ U4 (optional)
____ 1 - 8237A-5 @ U36
____ 1 - 8253-5 @ U49
____ 1 - 8255A-5 @ U37
____ 1 - 8259A @ U48
____ 1 - 8284A @ U1
____ 1 - 8288 @ U8

____ 1 - 27S13 @ U95B PROM
____ 1 - 2764 250 ns BOOT EPROM @ U35
____ 7 - 2764 250 ns EPROMs @ U28 to U34

For 256 K on-board: Strap pins 1-2 & 3-4 of JP3. Strap pins 1-2 of JP4

____36 - 4164 150 ns RAM @ BKS Ø,1,2,3

For 640 K on-board: Strap pins 5-6 & 7-8 of JP3. Strap pins 3-4 of JP4

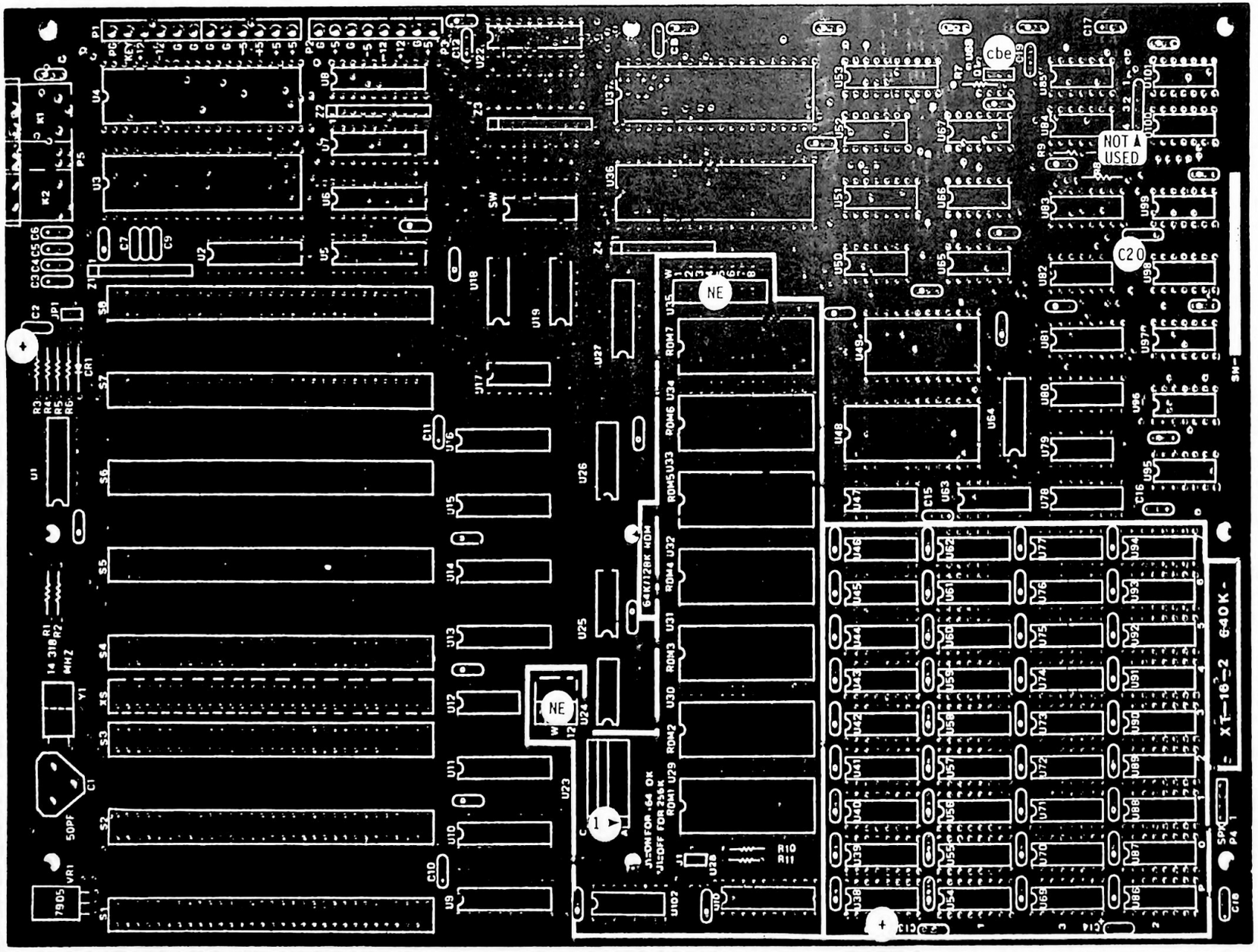
____18 - 41256 150 ns RAM @ BANK Ø,1
____18 - 4164 150 ns RAM @ BANK 2,3

BELTRON 640 K MOTHERBOARD (continued)

SWITCH SW1 SETTINGS: SYSTEM CONFIGURATION

SWITCH #	1	2	3 4	5 6	7 8
OPERATING MODE		8087	RAM	monitor	drive #
	normal off	no 8087 on	128K off on	none on on	1 on on
		with 8087 off	192K on off	40x25 colour off on	2 off on
			256K off off	80x25 colour on off	3 on off
				monochrome off off	4 off off

3-D MICRO 640 K MOTHERBOARD: Features include: 8088 MPU with socket for optional 8087 co-processor; eight expansion slots; on-board memory of 256 K bytes or 640 K bytes of RAM; seven ROM sockets. Requires firmware (one PAL). Documentation available from supplier.



Layout is reduced
Actual size is 30.5 x 21.9 cm

NuScope Associates

3D MICRO 640 K MOTHERBOARD (continued)

DIODE D *Position banded (cathode) end of diode towards the arrow

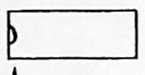
____ 1 - 1N4148

RESISTORS R ¼ watt, 5% *R8,9 not used

____ 4 - 22 Ω @ R3,4,5,11
____ 2 - 510 Ω @ R1,2
____ 2 - 1 KΩ @ R7,10
____ 1 - 10 KΩ @ R6
____ 4 - 4.7 KΩ 10-pin SIP* bussed @ Z1,2,3,4 *Match pin 1 of SIPs with pin 1 (square) on the layout
____ 2 - 33 Ω 16-pin DIP* @ U63,78 *Solder directly to the board Eight single 33 Ω resistors may be substituted for each DIP

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes *U20,21,28,68 are NOT equipped (NE)

____22 - 14-pin
____47 - 16-pin *Use A of U23
____ 1 - 18-pin
____14 - 20-pin
____ 1 - 24-pin
____ 8 - 28-pin
____ 4 - 40-pin



CAPACITORS C

____ 3 - 47 pF @ C7,8,9
____ 2 - 300 pF @ C20,CB
____66 - 0.1 µF Monolithic @
____14 - 4.7 µF Tantalum* @ C2 to 6 @ C10 to 18
____ 1 - 5-50 pF Trimcap @ C1

VOLTAGE REGULATOR *Install only if power supply lacks -5V

____ 1 - 7950 5V -ve regulator @ VR1

CRYSTAL Y *Fold crystal flat against the board before soldering. Solder the case to the grounding pads

____ 1 - 14.31818 MHz @ Y1

TRANSISTORS Q *Position ebc transistor leads as shown on the layout

____ 1 - 2N3904 @ Q1

SWITCH *W1-8 & W9-12 are not equipped

____ 1 - 8-position DIP @ SW

CONNECTORS *P3 is not equipped

____ 1 - 1x2 header, male, straight @ JP1 system reset
____ 1 - 1x2 header, male, straight @ J1 RAM select
____ 1 - 1x4 header, male, 90° @ P4 speaker
____ 1 - 12-pin power supply @ P1,2
____ 8 - 62-pin edge card-connectors @ S1 to S8
____ 1 - 5-pin 90° PCB DIN @ K1 of P5

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U85
____ 2 - 74LS02 @ U24,97
____ 4 - 74LS04 @ U18,67,100,95
____ 1 - 74LS10 @ U84
____ 1 - 74LS14 @ U101
____ 2 - 74LS20 @ U12,66
____ 1 - 74LS27 @ U17
____ 1 - 74LS32 @ U50
____ 1 - 74LS74 @ U52
____ 3 - 74LS138 @ U23,51,81
____ 1 - 74LS175 @ U83

INTEGRATED CIRCUITS (continued)

____ 5 - 74LS244 @ U6,9,10,11,16
____ 4 - 74LS245 @ U2,13,14,53
____ 1 - 74LS322 @ U22
____ 3 - 74LS373 @ U5,7,15
____ 1 - 74LS670 @ U26

____ 1 - 7407 @ U19

____ 2 - 74S00 @ U96,99
____ 2 - 74S08 @ U79,98
____ 2 - 74S74 @ U65,82
____ 1 - 74S138 @ U80
____ 3 - 74S157 @ U47,64,102
____ 1 - 74S175 @ U27
____ 1 - 74S280 @ U25

____ 1 - 8088 @ U3 MPU
____ 1 - 8087 @ U4 Optional co-proc
____ 1 - 8237A-5 @ U36
____ 1 - 8253-5 @ U49
____ 1 - 8255A-5 @ U37
____ 1 - 8259A @ U48
____ 1 - 8284A @ U1
____ 1 - 8288 @ U8

____ 1 - 14L4 PAL @ U103
____ 1 - 2764 BOOT EPROM @ ROM 7
____ 6 - 2764 EPROM @ ROM 1 to 6

J1 OFF for 256 K on board requires:

____36 - 4164 RAM @ BANKs Ø,1,2,3

J1 ON for 640 K on board requires:

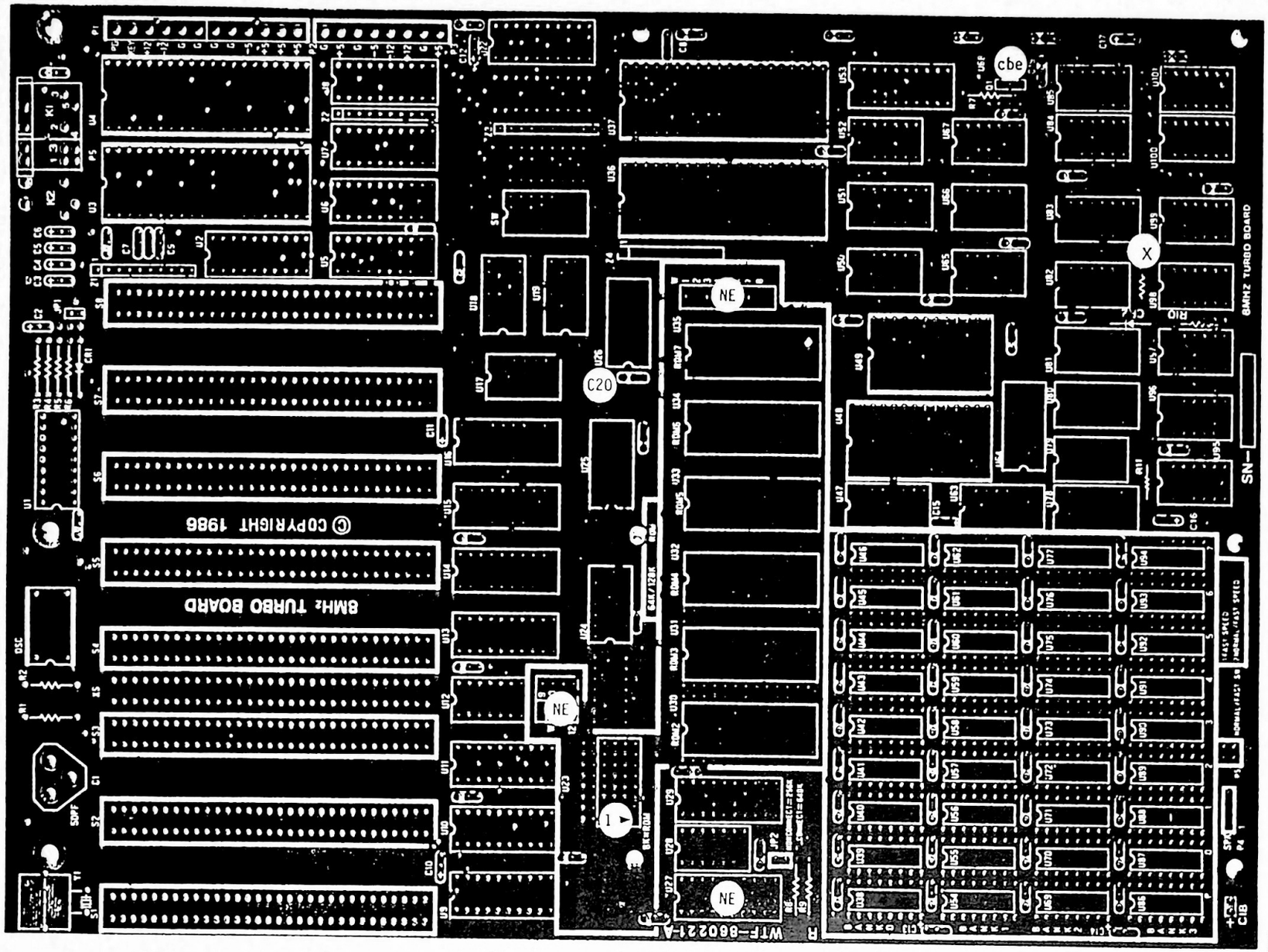
____18 - 41256 RAM @ BANKs Ø,1
____18 - 4164 RAM @ BANKs 2,3

3D MICRO 640 K MOTHERBOARD (continued)

SWITCH SW SETTINGS: SYSTEM CONFIGURATION

SWITCH #	1	2	3 4	5 6	7 8
OPERATING MODE		8087	RAM	monitor	drive #
	normal off	no 8087 on	128K off on	none on on	1 on on
		with 8087 off	192K on off	40x25 colour off on	2 off on
			256K off off	80x25 colour on off	3 on off
			640K off off	monochrome off off	4 off off

COLLEGE 8 MHZ TURBO MOTHERBOARD: Dual-speed four-layer board that runs at 4.77 MHz or 8 MHz (keyboard selectable) and features: 8088 MPU with socket for optional 8087 co-processor; eight I/O expansion slots; on-board memory of 256 K or 640 K bytes of RAM; six ROM sockets. Documentation available from supplier. Rerquires firmware (one PAL).



Layout is reduced
Actual size is 30.6 x 21.8 cm

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COLLEGE 8 MHZ TURBO MOTHERBOARD (continued) SUGGESTED SEQUENCE *INDICATES A PRECAUTION

DIODES D *Position banded (cathode) end of diodes towards the arrow

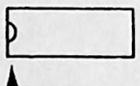
____ 1 - 1N4148 @ CR1,2

RESISTORS R ¼ watt, 5%
*R11 is NOT equipped

____ 3 - 27 Ω @ R3,4,5
____ 2 - 510 Ω @ R1,2
____ 3 - 1 KΩ @ R7,8,9,10,x
____ 1 - 27 KΩ @ R6
____ 4 - 4.7 KΩ10-pin SIP* bussed @ Z1,2,3,4 *Match pin 1 of SIPs with pin 1 (square) on the layout
____ 2 - 33 Ω 16-pin DIP* isolated, @ U63,78 *Solder directly to the board. Eight single resistors may be substituted for each DIP

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes
*U20,21,27,63,68,78 are NOT equipped

____22 - 14-pin
____45 - 16-pin
____ 1 - 18-pin
____15 - 20-pin
____ 1 - 24-pin
____ 7 - 28-pin
____ 4 - 40-pin



CAPACITORS C

____ 2 - 47 pF @ C8,9
____ 1 - 100 pF @ C7
____ 2 - 330 pF @ C20,CB
____68 - 0.1 µF Monolithic @ C19 &
*Match + of the following Tantalums with + on the layout
____ 2 - 4.7 µF/16V Tantalum* @ C2,6
____10 - 10 µF/16V Tantalum* @ C5, C10 to 18
____ 2 - 10 µF/25V Tantalum* @ C3,4
____ 1 - 5-50 pF Trimcap @ 50PF

CRYSTAL Y *Fold crystal Y1 flat against the board before soldering. Solder the case to the grounding pads

____ 1 - 14.31818 MHz @ Y1
____ 1 - 24.000 MHz Oscillator @ OSC *Note pin 1

TRANSISTOR Q *Position ebc transistor leads as shown on the layout

____ 1 - 2N3904 @ Q1

SWITCH *W1-8, W9-12 are NOT equipped

____ 1 - 8-position DIP @ SW

CONNECTORS *P3 is NOT equipped

____ 1 - 1x2 header, male, straight @ JP1 system reset
____ 1 - 1x2 header, male, straight @ JP2 RAM select
____ 1 - 1x4 header, male 90° @ P4 speaker
____ 1 - 12-pin power supply @ P1,2
____ 8 - 62-pin edge card connectors @ S1 to S8
____ 1 - 5-pin 90° PCB DIN keyboard @ K1 of P5
____1 - 2x4 header, male, straight @ P5

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U85
____ 1 - 74LS02 @ U97
____ 4 - 74LS04 @ U18,67,95,100
____ 2 - 74LS08 @ U79,98
____ 1 - 74LS10 @ U84
____ 1 - 74LS14 @ U101
____ 2 - 74LS20 @ U12,26
____ 1 - 74LS27 @ U17
____ 1 - 74LS32 @ U50
____ 1 - 74LS74 @ U52
____ 1 - 74LS92 @ U28
____ 2 - 74LS138 @ U23,51

INTEGRATED CIRCUITS (continued)

____ 2 - 74LS175 @ U26,83
____ 5 - 74LS244 @ U6,9,10,11,16
____ 4 - 74LD245 @ U2,13,14,53
____ 1 - 74LS322 @ U22
____ 3 - 74LS373 @ U5,7,15
____ 1 - 74LS670 @ U25

____ 1 - 7407 @ U19

____ 2 - 74S00 @ U96,99
____ 2 - 74S74 @ U65,82
____ 2 - 74S138 @ U80,81
____ 2 - 74S157 @ U47,64
____ 1 - 74S280 @ U24

____ 1 - 8088 @ U3 MPU
____ 1 - 8087 @ U4 Co-Proc optional
____ 1 - 8237A-5 @ U36
____ 1 - 8253-5 @ U49
____ 1 - 8255A-5 @ U37
____ 1 - 8259A @ U48
____ 1 - 8284A @ U1
____ 1 - 8288 @ U8

____ 1 - 16L8 PAL @ U29
____ 1 - 2764 BOOT EPROM @ ROM7
____ 5 - 2764 EPROM @ ROM2 to 6

JP2 non-connect for 256 K & requires:
____36 - 4164 DRAM @ BANKs Ø,1,2,3
JP2 connect for 640 K & requires:
____18 - 41256 DRAM @ BANKs Ø,1
____18 - 4164 DRAM @ BANKs 2,3

COLLEGE 8 MHZ TURBO MOTHERBOARD (continued)

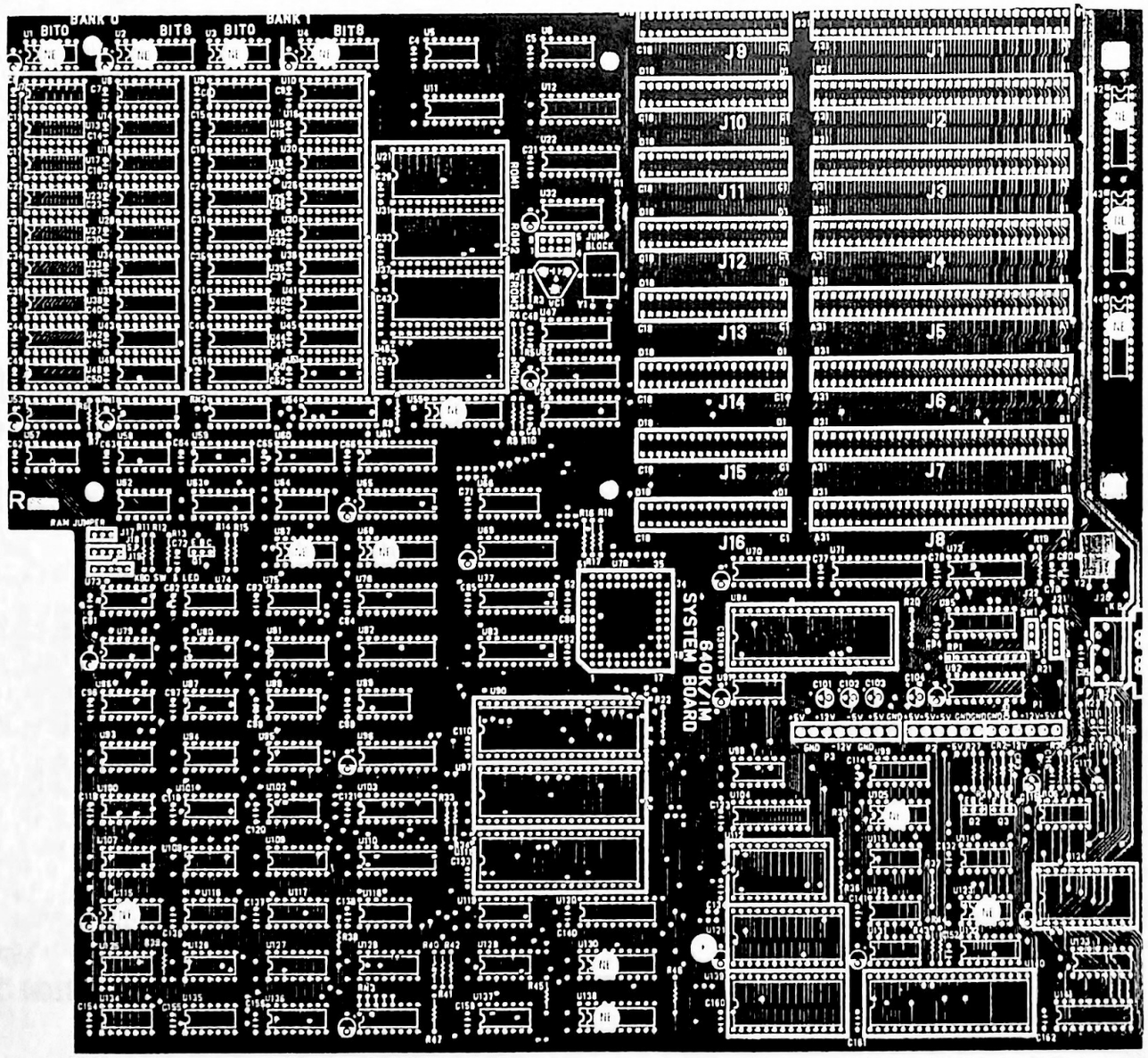
SWITCH SW SETTINGS: SYSTEM CONFIGURATION

SWITCH #	1	2	3 4	5 6	7 8
		8087	RAM	monitor	drive #
OPERATING MODE	normal off Turbo on	no 8087 on with 8087 off	128K off on 192K on off 256K off off 640K off off	none on on 40x25 colour off on 80x25 colour on off monochrome off off	1 on on 2 off on 3 on off 4 off off

NORMAL/TYRBO MODE SELECTION:
Strap 1 of P5 for permanent TURBO mode
Strap 2 of P5 for NORMAL/TURBO mode

KEYBOARD TOGGLE BETWEEN NORMAL,& TURBO MODES:
Depress & hold "Ctrl" & "Alt" &
depress "-" of the numeric keypad

GOLD FOLD ATC MOTHERBOARD: Four-layer PC board that runs at 6 MHz, upgradable to 8 MHz with 16 MHz crystal installed. Features include: 80286 MPU with socket for optional 80287 co-processor; eight expansion slots; on-board memory of 640 K expandable to 1 M; four EPROM sockets; on-board real-time/clock-calendar. Requires firmware (four EPROMs, two PROMs, two PALs, keyboard encoder).



Reduced in size
Actual size is 35.2 x 30.6 cm

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GOLD FOLD ATC MOTHERBOARD (continued)

DIODES D * Position banded (cathode) end of diode towards the arrow

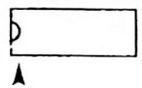
____ 2 - 1N4148 @ CR2,3

RESISTORS R ¼ watt, 5% *R26 not shown

____ 3 - 33 Ω @ R1,8,13
____ 1 - 150 Ω @ R15
____ 6 - 300 Ω @ R10,16,21,23,38,41
____ 2 - 470 Ω @ R43,44
____ 2 - 510 Ω @ R2,3
____ 7 - 1 KΩ @ R9,11,14,19,30,40,45
____ 1 - 4.7 KΩ @ R46
____22 - 10 KΩ @ R4,5,6,7,12,17,18,20 R22,24,25,27,29,32, R33,34,35,36,37,39, R42,47
____ 1 - 51.1 KΩ @ R28
____ 1 - 2.2 MΩ @ R31
____ 3 - 33 Ω 16-pin DIP, isolated *Solder directly to the board Eight 33 Ω single resistors may be substituted @ RN1,2,3
____ 1 - 4.7 KΩ 10-pin SIP, bussed @ RP1. *Match pin 1 of SIP with pin 1 (dot) on layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes. *Items marked "NE" are "not equipped"

____36 - 14-pin
____51 - 16-pin
____ 2 - 18-pin
____22 - 20-pin
____ 2 - 24-pin
____ 1 - 24-pin *0.3" row spacing @ U71
____ 6 - 28-pin
____ 5 - 40-pin



SOCKETS (continued)

____ 1 - 68-pin socket OR Leadless Chip Carrier, depending on manufacturing package of 80286 *Note pin 1

CAPACITORS C *Install capacitors at the following locations only

____ 1 - 10 pF @ C79
____ 2 - 33 pF @ C80,117
____ 3 - 47 pF @ C95,111,112
____ 1 - 100 pF @ C72
____ 1 - 0.0047 µF @ C16
____ 1 - 0.047 µF @ C92
____86 - 0.1 µF Monolithic @ C4 to C9, @ C13 to 26, C29 to 37, C39 to 53, @ C62 to 66, 71,77,78,81, @ C81 to 86, 93, C96 to 99, 110, @ C114, C118 to 121, 123, @ C132 to 134, C136 to 138, 140, @ C141, C154 to 156, 158, @ C160 to 162
____23 - 10 µF/16V Tantalum* @ *Match + of Tantalum with + on the layout
____ 1 - 5-50pF Trimmer cap @ VC1

CRYSTALS Y *Fold crystals flat aginst the board berore soldering. Solder the case of Y1,2 to the grounding pads

____ 1 - 32.768
____ 1 - 14.31818 MHz @ Y1

OPTION: Install either 12 or 16 MHZ @ Y2

____ 1 - 12.0000* MHz to run @ 6 MHz
____ 1 - 16.0000 MHz to run @ 8 MHz
*12.0000 MHz recommended

TRANSISTORS Q *Match EBC transistor leads with EBC on the layout

____ 2 - 2N3904 @ Q1,2
____ 1 - 2N3906 @ Q3

HEADERS male, straight

____ 1 - 1x3 @ J17 RAM JUMPER
____ 1 - 1x4 @ J18 S.P
____ 1 - 1x5 @ J19 KBD SW. & LED
____ 1 - 1x4 @ J21 BAT *Note POLARITY
____ 1 - 1x3 @ J22 SW1 *Single-pole/ double-throw switch may be substituted
____ 1 - 2x4 @ JUMP BLOCK

CONNECTORS

____ 1 - 5-pin 90° PCB DIN @ K20 K.B
____ 8 - 62-pin edge card-connectors @ J1,2,3,4,5,6,7,8
____ 6 - 36-pin edge card-connectors @ J10,11,12,13,14,16
____ 2 - 6-pin (0.156" centers) male power supply connectors @ P1,2 *P3 not equipped
____ - - jumper plugs

GOLD FOLD ATC MOTHERBOARD (continued)

DELAY LINE *Solder directly to the board

____ 1 - 200 ns @ U62

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 7407 @ U131

____ 2 - 74LS51 @ U79,125
____ 1 - 74LS112 @ U128
____ 1 - 74LS125 @ U88
____ 1 - 74LS245 @ U92
____ 1 - 74LS590 @ U66
____ 1 - 74LS612 @ U90 *40-pin
____ 1 - 74LS646 @ U71 *24-pin at 0.3" row spacing

____ 2 - 74ALS00 @ U114,134
____ 2 - 74ALS02 @ U102,113
____ 3 - 74ALS04 @ U75,122,126
____ 1 - 74ALS08 @ U98
____ 1 - 74ALS10 @ U116
____ 1 - 74ALS27 @ U94
____ 1 - 74ALS32 @ U107
____ 7 - 74ALS74 @ U80,86,87,93, U101,129,137
____ 1 - 74ALS138 @ U117
____ 1 - 74ALS175 @ U133
____ 3 - 74ALS244 @ U54,56,141
____ 8 - 74ALS245 @ U11,12,22,61,65 U70,83,104
____ 6 - 74ALS573 @ U52,69,76,77 U96,103

____ 2 - 74S51 @ U64,95

____ 1 - 74F00 @ U118
____ 2 - 74F08 @ U74,135
____ 4 - 74F10 @ U53,57,58,91
____ 1 - 74F11 @ U108
____ 1 - 74F20 @ U89
____ 3 - 74F74 @ U73,100,119
____ 1 - 74F139 @ U32
____ 3 - 74F158 @ U59,60,63
____ 2 - 74F174 @ U109,127
____ 1 - 74F175 @ U81
____ 1 - 74F195 @ U136
____ 1 - 74F257 @ U99
____ 1 - 74F280 @ U5,6

____ 1 - CD4069 @ U106
____ 1 - MC146818 @ U124

____ 2 - 8237-5 @ U97,111
____ 1 - 8254-2 @ U112
____ 2 - 8259A @ U121,139
____ 1 - 8284 @ U47
____ 1 - 80286-6 @ U78 MPU
____ 1 - 80287-6 @ U84 co-processor (optional)
____ 1 - 82284-6 @ U85
____ 1 - 82288-6 @ U72

____ 1 - 8728 @ U140 Keyboard encoder *To match keyboard

____ 4 - 27128 EPROM 200 ns @ ROM 1,2,3,4
____ 1 - 28S42 PROM @ U82
____ 1 - 74S288 PROM @ U132
____ 2 - 16L8 PAL @ U110,120

CONNECTOR PINOUTS
EPROM SELECT @ JUMP BLOCK
Strap pins 1-8 & 2-7 for four 27128 EPROMs
Strap pins 3-6 & 4-5 for two 27256 EPROMS

RAM JUMPER @ J17
Not equipped for 640 K RAM

CONNECTOR PINOUTS

	PIN	DESCRIPTION
SPEAKER	J18	
	1	signal
	2	not equipped
	3	ground
	4	+5V DC
KEYLOCK & LAMP JACK	J19	
	1	LED power
	2	key
	3	ground
	4	keyboard inhibit
	5	ground
KEYBOARD	J20	
	1	keyboard clock
	2	keyboard data
	3	spare
	4	ground
	5	+5V DC

BATTERY Secure external power pack with 4 AA batteries to rear of case & connect to J21 *Match polarity

1	+6V DC
2,3	not used
4	ground

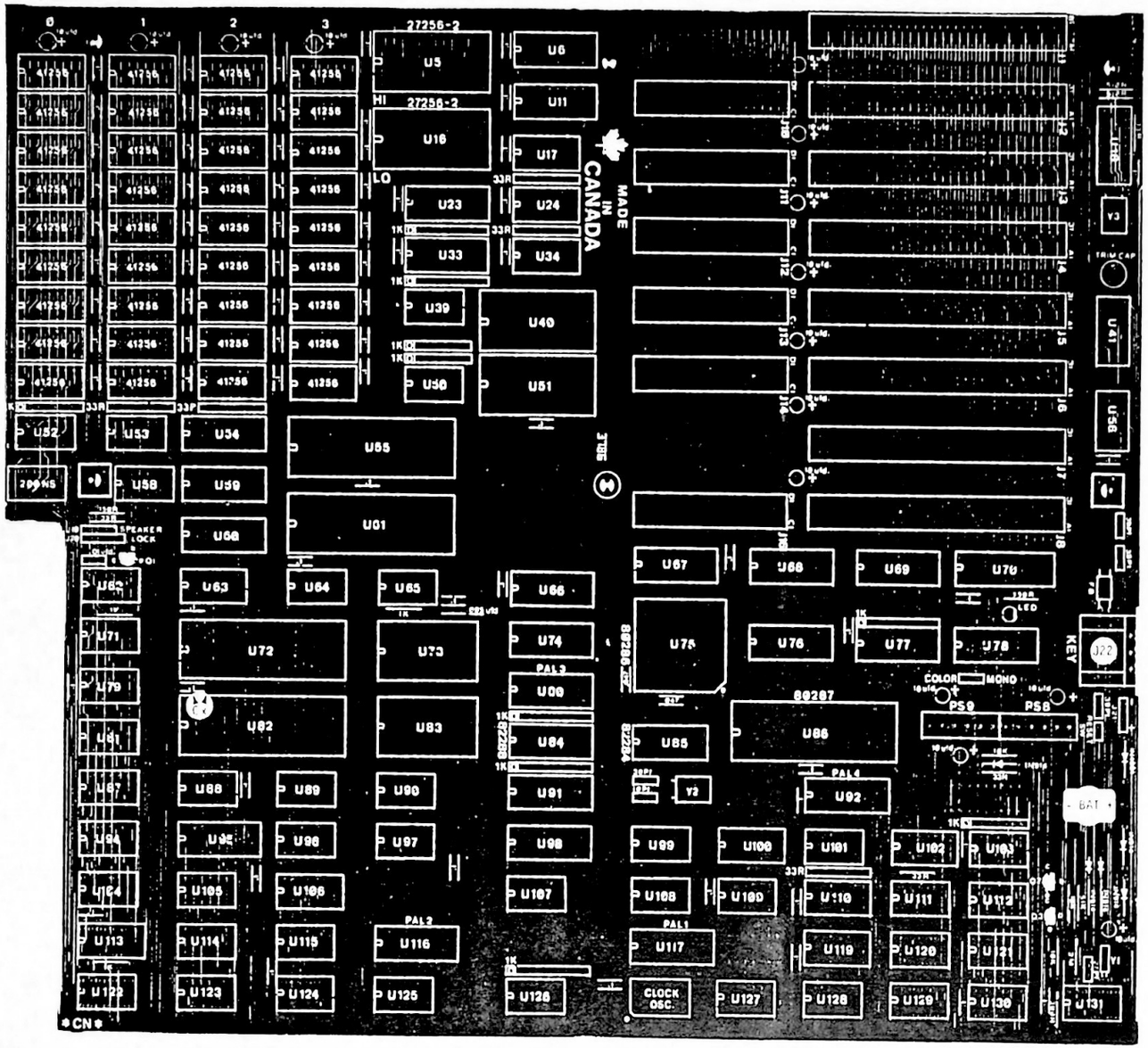
MONO-COLOR SELECT J22 SW1

1-2	mono
2-3	color

POWER SUPPLY P1 P2 only

P1	1	power good
	2	+5V
	3	+12V
	4	-12V
	5,6	ground
P2	1,2	ground
	3	-5V
	4,5,6	+5V

PRELUDE ATC MOTHERBOARD: Dual speed four-layer board that runs at 6 or 8 MHz (keyboard selectable) or optional 10 or 12 MHz; 80286 MPU with socket for optional 80287 co-processor; eight expansion slots; on-board memory of 1 K bytes of memory, expandable to 4 M bytes using 1 M RAM ICs; two EPROM sockets; real-time/clock-calendar on-board; external hardware reset. Requires firmware (2 EPROMs, 4 PALs, 1 keyboard encoder).



Reduced in size
Actual size is 30.3 x 15.4 cm

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PRELUDE ATC MOTHERBOARD (continued)

FERRITE BEADS

____ 2 - ferrite beads @ F8 jumper wires may be substituted

DIODES D *Position banded (cathode) end of diodes towards the arrow. White bar for LED

____ 5 - 1N914
____ 1 - 1N4001
____ 1 - LED *Install after sockets

RESISTORS R ¼ watt, 5%

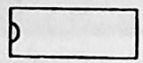
____ 5 - 33 Ω @ 33R
____ 2 - 150 Ω @ 150R
____ 1 - 300 Ω @ 300R
____ 2 - 510 Ω @ 510R
____ 3 - 1 KΩ @ 1K
____ 3 - 10 KΩ @ 10K
____ 1 - 51 KΩ @ 51K
____ 1 - 2 MΩ @ 2M

*Match pin 1 of the following bussed SIP resistors with pin 1 (square) on the layout

____ 4 - 1 KΩ 8-pin bussed* @ 1K
____ 6 - 1 KΩ 10-pin bussed* @ 1K
____ 5 - 33 Ω 8-pin isolated @ 33R

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____43 - 14-pin
____47 - 16-pin
____ 2 - 18-pin
____23 - 20-pin
____ 2 - 24-pin
____ 1 - 24-pin *0.3" row spacing @ U70
____ 4 - 28-pin
____ 5 - 40-pin
____ 1 - 68-pin socket OR Leadless Chip Carrier, depending on manufacturing package of 80286 *Note pin 1 - white dot



SUGGESTED SEQUENCE *INDICATES A PRECAUTION

CAPACITORS C *Note pin placement of Cx*

____ 1 - 10 pF @ 10Pf.
____ 1 - 27 pF @ 27Pf.
____ 1 - 30 pF @ 30Pf.
____ 3 - 39 pF @ 39Pf.
____ 1 - 0.005 µF @ .005 ufd.
____ 1 - 0.01 µF @ .01 ufd.
____ 2 - 0/047 µF @ .047 ufd.
____70 - 0.1 µF Monolithic @ Cx* & .1 ufd.
____15 - 10 µF/16V Tantalum* @ 10 ufd. *Match + of Tantalums with + on the layout
____ 1 - 5-50 pF Trimmer cap @ TRIM CAP

CRYSTAL Y *Fold crystals flat against the board before soldering. Solder the case of Y2 & Y3 to the grounding pads

____ 1 - 32.768 KHz @ Y1
____ 1 - 12.0000 MHz @ Y2 *Insulate case from underlying plate-thru holes
____ 1 - 14.31818 MHz @ Y3
____ 1 - 16.0000 MHz oscillator* @ CLOCK OSC. Note pin 1-white dot

OPTIONAL: Replace 16 MHz oscillator with 20 MHz or 24 MHz oscillator to run at 10 MHz or 12 MHz, respectively. Suggest higher speed 80286, 82284, 82288 and 120 ns DRAM ICs.

TRANSISTORS Q *Match ebc transistor leads with ebc on the layout

____ 2 - 2N3904 @ Q1,3
____ 1 - 2N3906 @ Q2

BATTERY

____ 2 - 3.0 V Li @ BAT *NOT RECOMMENDED

*Instead, secure an external back-up power-pack with 4 AA batteries to rear of case & connect with appropriate cable to J21 *Match polarity of battery with J21

HEADERS Male, straight

____ 1 - 1x2 @ RESET SW
____ 1 - 1x3 @ COLOR MONO or SP/DT SW.
____ 1 - 1x4 @ J19 SPEAKER remove pin 2
____ 1 - 1x5 @ J20 LOCK remove pin 2
____ 1 - 1x4 @ J21 *Note POLARITY

CONNECTORS *J9,15,17,18 not shown

____ 1 - 5-pin 90° PCB DIN @ J22 KEY (board)
____ 8 - 62-pin edge card-connectors @ J1,2,3,4,5,6,7,8
____ 6 - 36-pin edge card-connectors @ J10,11,12,13,14,16
____ 2 - 6-pin (0.156" centers) male power supply connectors @ PS8,9
____ - - jumper plugs

PRELUDE ATC MOTHERBOARD (continued)

DELAY LINE *Solder directly to the board

____ 1 - 200 ns @ 200 NS

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout.
*U57,93,118 are NOT silk-screened

____ 2 - 7407 @ U21,56

____ 2 - 74LS51 @ U81,125
____ 1 - 74LS112 @ U110
____ 2 - 74LS125 @ U89,120
____ 1 - 74LS245 @ U91
____ 1 - 74LS590 @ U41
____ 1 - 74LS646 @ U70 *24-pin at 0.3" row spacing
____ 1 - 74LS612 @ U82 *40-pin

____ 1 - 74ALS00 @ U127
____ 2 - 74AKS02 @ U94,109
____ 2 - 74ALS04 @ U65,107
____ 1 - 74ALS10 @ U123
____ 1 - 74ALS27 @ U122
____ 1 - 74ALS32 @ U129
____ 5 - 74ALS74 @ U39,101,111,103,112
____ 1 - 74ALS138 @ U17
____ 1 - 74ALS175 @ U63
____ 3 - 74ALS244 @ U98,78,60
____ 8 - 74ALS245 @ U6,11,23,33,66 U67,74,76
____ 6 - 74ALS373 @ U54,59,68,69,77,95

____ 2 - 74S51 @ U50,124

____ 2 - 74F00 @ U64,104
____ 3 - 74F04 @ U79,88,130
____ 3 - 74F08 @ U71,97,128
____ 3 - 74F10 @ U58,62,90
____ 1 - 74F11 @ U115
____ 1 - 74F20 @ U87

INTEGRATED CIRCUITS (continued)

____ 1 - 74F32 @ U96
____ 5 - 74F74 @ U99,105,108,114,126
____ 2 - 74F157 @ U24,34
____ 2 - 74F174 @ U100,113
____ 2 - 74F175 @ U106,119
____ 1 - 74F257 @ U102
____ 2 - 74F280 @ U52,53

____ 1 - MC14069 @ U131
____ 1 - MC146818 @ U73

____ 2 - 8237-5 @ U55,61
____ 1 - 8254-2 @ U83
____ 2 - 8259A @ U40,51
____ 1 - 8284 @ U18
____ 1 - 80286 @ U75 MPU
____ 1 - 80287 @ U86 co-processor (optional)
____ 1 - 82284 @ U85
____ 1 - 82288 @ U84

____ 1 - 8742 @ U72 Keyboard encoder* to match keyboard
____ 2 - 27128 EPROM 200 ns @ U5,16
____ 4 - 16Ls PAL @ U80,92,116,117
____36 - 41256 DRAM 150 ns @ BANKS Ø,1,2,3

CONNECTOR PINOUTS

SPEAKER @ J19

PIN	DESCRIPTION
1	signal
2	not equipped
3	ground
4	+5V DC

KEYLOCK @ J20

1	LED power
2	key
3	ground
4	keyboard inhibit
5	ground

CONNECTOR PINOUTS (continued)

BATTERY @ J21

PIN	DESCRIPTION
1	ground
2	not equipped
3	not equipped
4	6V DC

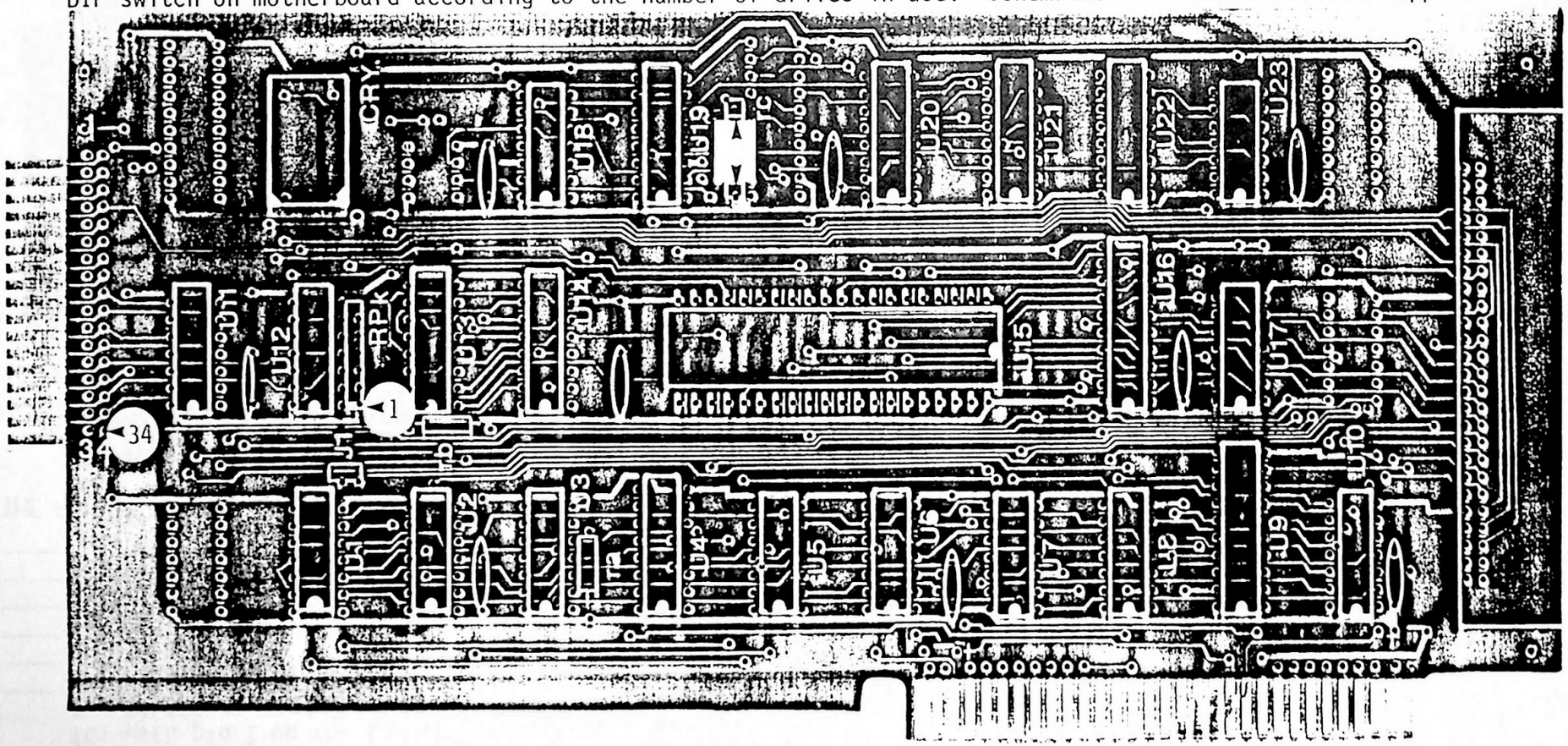
KEYBOARD @ J22

1	keyboard clock
2	keyboard data
3	spare
4	ground
5	+5V DC

POWER SUPPLY @ PS8, PS9

PS8	1	power good
	2	+5V
	3	+12V
	4	-12V
	5,6	ground
PS9	1,2	ground
	3	-5V
	4,5,6	+5V

RHE DISK CONTROLLER CARD: Allows user to run up to four 5¼" floppy disk drives. With power off, install in any available slot. Requires firmware (one PROM). To run 8" drives, extra devices are required (not shown). Position DIP switch on motherboard according to the number of drives in use. Schematics are available from supplier.



SUGGESTED SEQUENCE *INDICATES A PRECAUTION

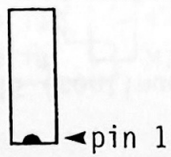
Actual size is 24.2 x 10.8 cm.

RESISTORS R ¼ watt 5%

____ 1 - 150 Ω @ Rb
____ 1 - 4.7 KΩ @ Ra
____ 1 - 4.7 KΩ @ Rc *Position resistor as shown on the layout
____ 1 - 1 KΩ 6-pin SIP @ RPk *Match pin 1 of SIP with pin 1 on the layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 13 - 14-pin
____ 7 - 16-pin
____ 2 - 20-pin
____ 1 - 40-pin



CAPACITORS C

____ 9 - 0.1 µF Monolythic @ positions ()
____ 2 - 10 µF/25V Radial @ positions
*Match + of Radials with + on layout

OSCILLATOR (crystal)

____ 1 - 16.0000 MHz @ CRY

RHE DISK CONTROLLER CARD (CONTINUED)

CONNECTORS

____ 1 - 2-pin header, male, straight @ J1
____ 1 - jumper plug - install @ J1 for 5¼" drive operation
____ 1 - rear panel adaptor

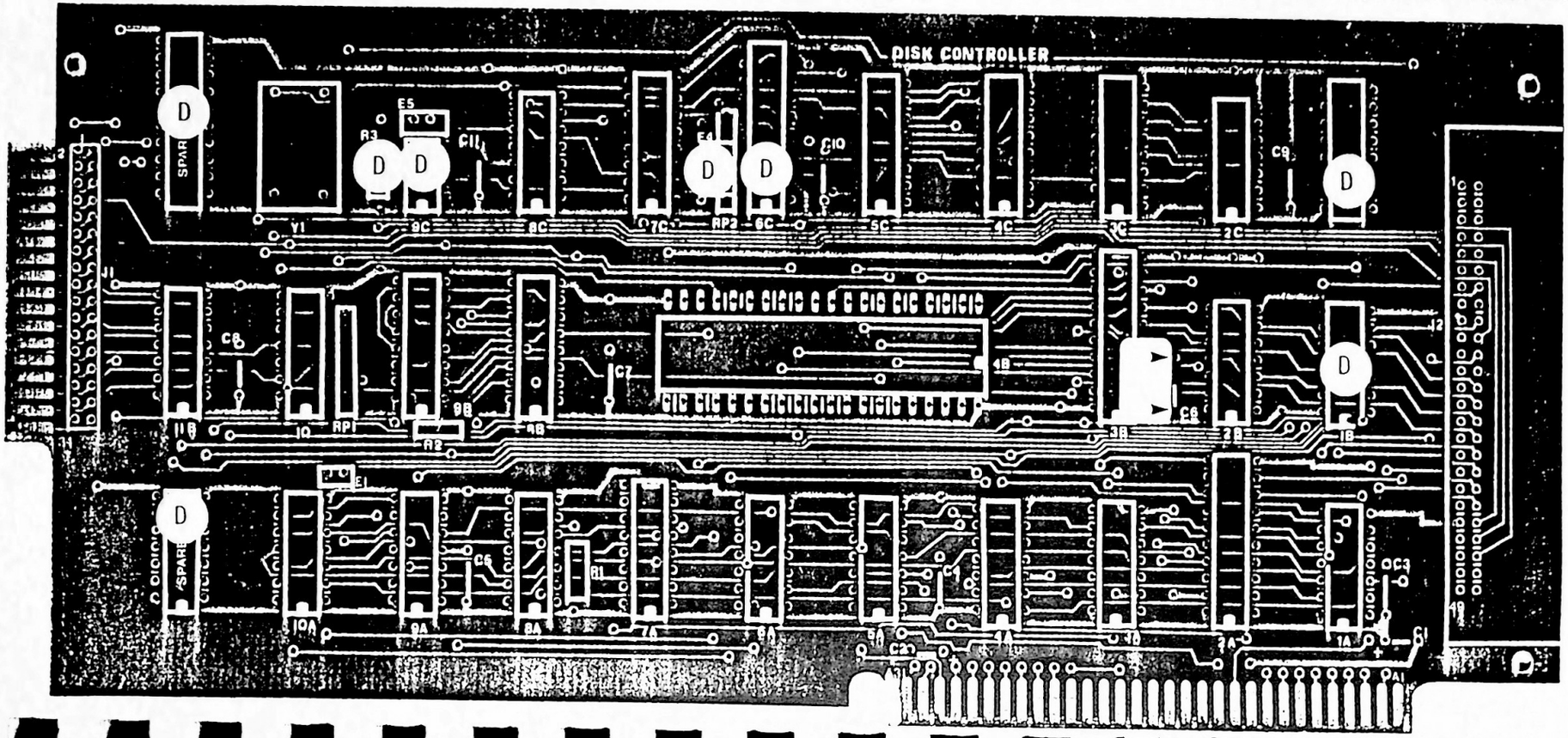
INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U1
____ 3 - 74LS04 @ U10,12,23
____ 1 - 74LS08 @ U5
____ 1 - 74LS30 @ U7
____ 2 - 74LS32 @ U2,6
____ 1 - 74LS74 @ U3

INTEGRATED CIRCUITS (continued)

____ 1 - 74LS126 @ U8
____ 1 - 74LS139 @ U22
____ 1 - 74LS153 @ U20
____ 1 - 74LS163 @ U19
____ 1 - 74LS174 @ U14
____ 2 - 74LS175 @ U4,21
____ 1 - 74LS245 @ U9
____ 1 - 74LS273 @ U16
____ 1 - 74LS393 @ U18
____ 1 - 7406 @ U11
____ 1 - 7438 @ U17
____ 1 - 765 (NEC) or 8272 (INTEL) @ U15
____ 1 - 82S123 PROM @ U13

*S ICs can be substituted for LS ICs



THE FOLLOWING CARD IS IDENTICAL EXCEPT FOR THE SILK-SCREENING. Use the preceding parts list. Delete components labelled "D".

RHE DISK CONTROLLER CARD (continued):

USING THE CARD:

The RHE Disk Controller Card does not use the same disk select scheme as IBM. IBM uses a twist in the ribbon cable connecting the drives to the controller to select between drives. On the other hand, the RHE uses a more conventional approach of using jumpers on the drive to do drive select. IBM has a separate line for "motor select" while the RHE uses "drive select" to turn the motor on. Since "drive select" is gated by "motor select", the operation of the drive motor is identical for both the RHE and the IBM disk contorller.

*If no drives are selected by a DS#, then none will run.
*If two are selected by the same DS# then erratic operation or damage may result.

1) TANDON ½ HEIGHT

1---16 HS In
2---15 DSO
3---14 DS1
4---13 DS2
5---12 DS3
6---11 MUX OUT
8--- 9 HM IN

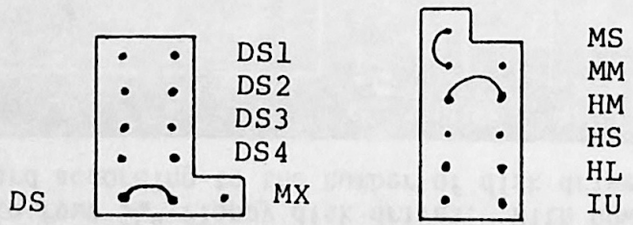
2) TEAC ½ HEIGHT

DSO
DS1
DS2
DS3
MX OUT
MS IN
ST IN
WT OUT

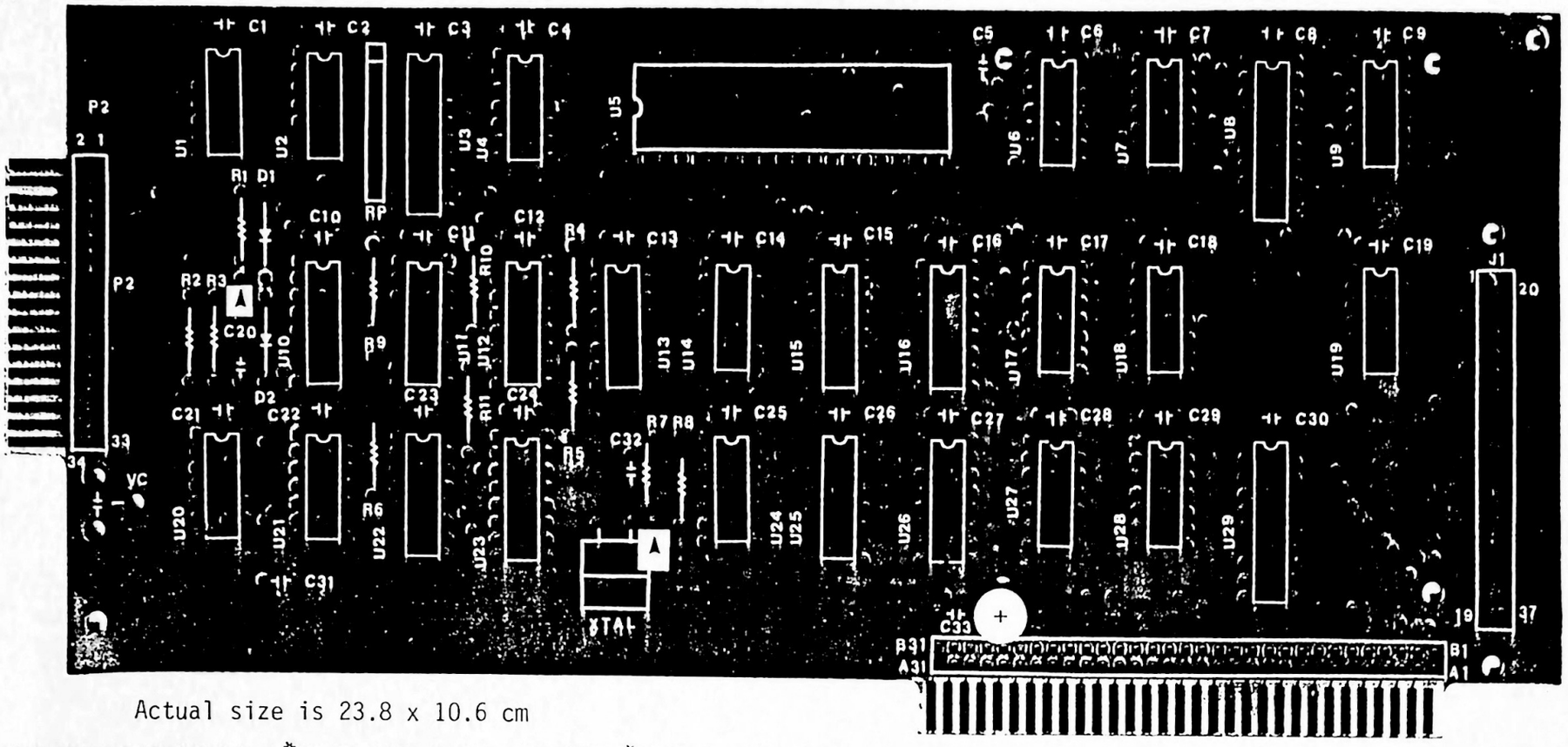
2) SHUGART ½ HEIGHT

DS1
DS2
DS3
DS4
MX OUT
MS IN

3) PANASONIC ½ HEIGHT



PG DISK CONTROLLER CARD: Allows user to run up to four 5¼" floppy disk drives. With power off, install in any available slot. Position DIP switch on motherboard according to the number of disk drives in use.

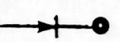


Actual size is 23.8 x 10.6 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION *MODIFICATION MAY BE REQUIRED

DIODES D *Position banded end of diode (cathode) as shown

____ 2 - 1N914 or 1N4148 @ D1,2



RESISTORS R ¼ watt, 5%

____ 2 - 330 Ω @ R7*,8
____ 1 - 470 Ω @ R1*
____ 3 - 1 KΩ @ R4,9,11
____ 3 - 1.8 KΩ @ R5,6,10
____ 1 - 3.3 KΩ @ R3
Note location of lower solder hole (arrow) for R1 and R7*

____ 1 - 2KΩ @R2

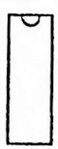
RESISTORS (continued)

____ 1 - 1 KΩ SIP*, 9-pin @ RP
*Match pin 1 of SIP with pin 1 (square) on the layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____16 - 14-pin
____ 9 - 16-pin
____ 3 - 20-pin
____ 1 - 40-pin

pin 1 ➤



CAPACITORS C *Delete VC *See MOD.

____ 1 - 82 pF @ C31 *See MOD.
____ 1 - 0.001 µF @ C32
____29 - 0.1 µF Monolythic @ C1 to 30
____ 1 - 47 µF/16V Radial* @ C33
*Match + of Radial with + on the layout
____ 1 - 0.047 µF Polystyrene @ C20

PG DISK CONTROLLER CARD (continued)

CRYSTAL Y *Fold crystal flat against the card before soldering

____ 1 - 16.000 Mhz @ XTAL

ADAPTER

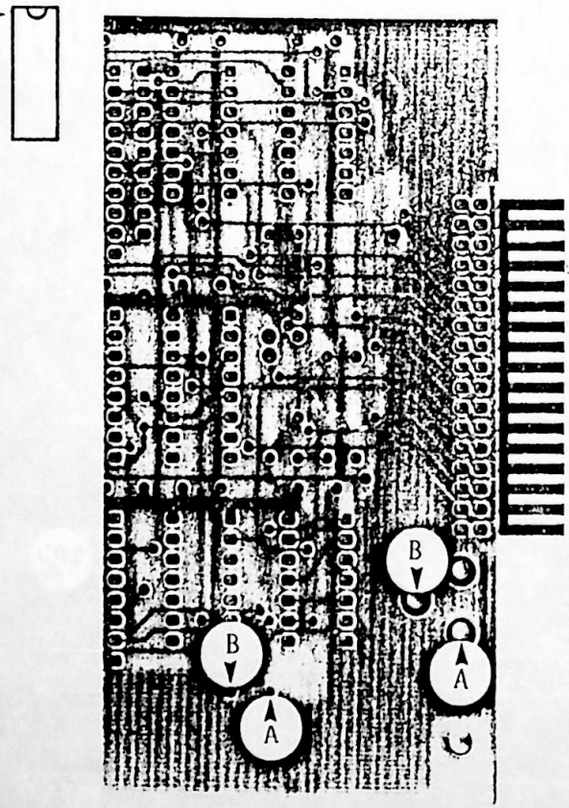
____ 1 - rear panel adapter

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS02 @ U28
____ 1 - 74LS04 @ U18
____ 3 - 74LS08 @ U4,7,17
____ 1 - 74LS30 @ U27
____ 1 - 74LS32 @ U6
____ 4 - 7438 or 74S38 @ U1,2,9,19
____ 1 - 74LS93 @ U14
____ 1 - 74LS109 @ U13
____ 2 - 74LS112 @ U11,12
____ 2 - 74LS153 @ U22,25
____ 1 - 74LS161 @ U23
____ 2 - 74LS175 @ U15,16
____ 1 - 74LS191 @ U10
____ 1 - 74LS240 @ U3
____ 1 - 74LS245 @ U29
____ 1 - 74LS273 @ U8

____ 1 - D765 @ U5
____ 1 - MC4044 @ U20
____ 1 - MC4024 @ U21
____ 1 - 7404 @ U24
____ 1 - MC3487 @ U26

pin 1 ➤



*MODIFICATION MAY BE REQUIRED on first run cards

Drives may not run as 82 pF capacitor @ C31 is critical. REPLACE 82 pF with a 47 pF cap AND:

a) ON COMPONENT SIDE: install one 5-50 pF trimcap @ VC;

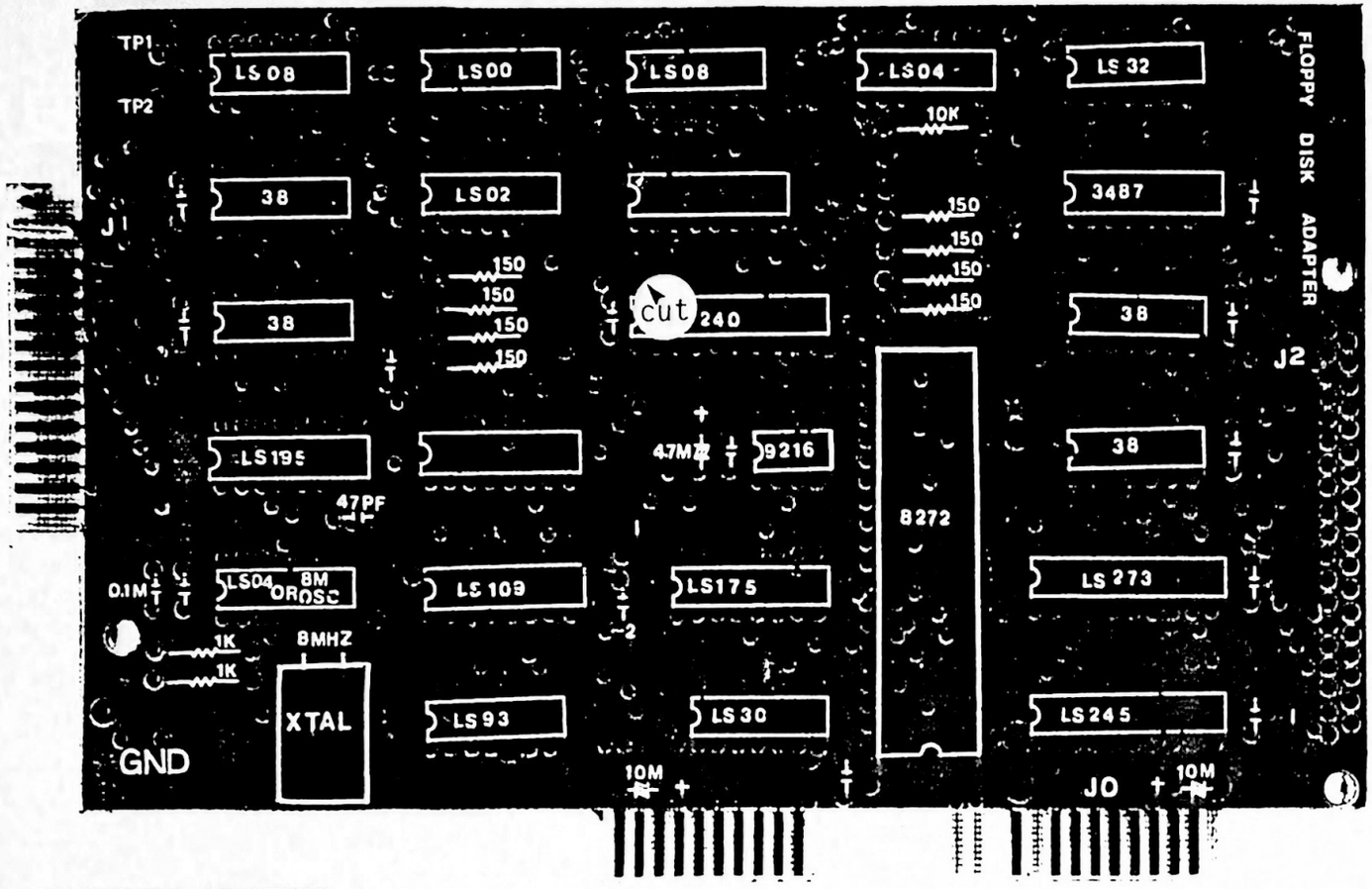
b) ON SOLDER SIDE: strap A to A, and B to B, as shown on the layout

Adjust trimcap @ VC until drives run

SOLDER SIDE

NuScope Associates

FLOPPY DISK ADAPTER: Allows user to run up to four 5¼" floppy disc drives. With power off, install in any available slot. Position DIP switch on motherboard according to the number of drives in use.

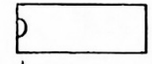


SUGGESTED SEQUENCE
*INDICATES A PRECAUTION *MODIFICATION REQUIRED

RESISTORS R ¼ watt, 5%
____ 8 - 150 Ω
____ 2 - 1 KΩ
____ 1 - 10 KΩ

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes
____ 1 - 8-pin
____ 13 - 14-pin

SOCKETS (continued)
____ 4 - 16-pin
____ 3 - 20-pin
____ 1 - 40-pin



CAPACITORS C *Match + of caps with + on the layout
____ 1 - 47 pF
____ 14 - 0.1 µF Monolythic @
____ 1 - 4.7 µF/25V Tantalum*
____ 2 - 10 µF/25V Tantalum*
*Match + of caps with + on layout

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout
____ 1 - 74LS00
____ 1 - 74LS02
____ 2 - 74LS04
____ 2 - 74LS08
____ 1 - 74LS30
____ 1 - 74LS32
____ 4 - 7438 or 74S38 @ 38
____ 1 - 74LS93
____ 1 - 74LS109
____ 1 - 74LS175
____ 1 - 74LS195
____ 1 - 74LS240
____ 1 - 74LS245
____ 1 - 74LS273

____ 1 - MC 3487
____ 1 - FDC9216 (8-pin)
____ 1 - 8272 (INTEL)

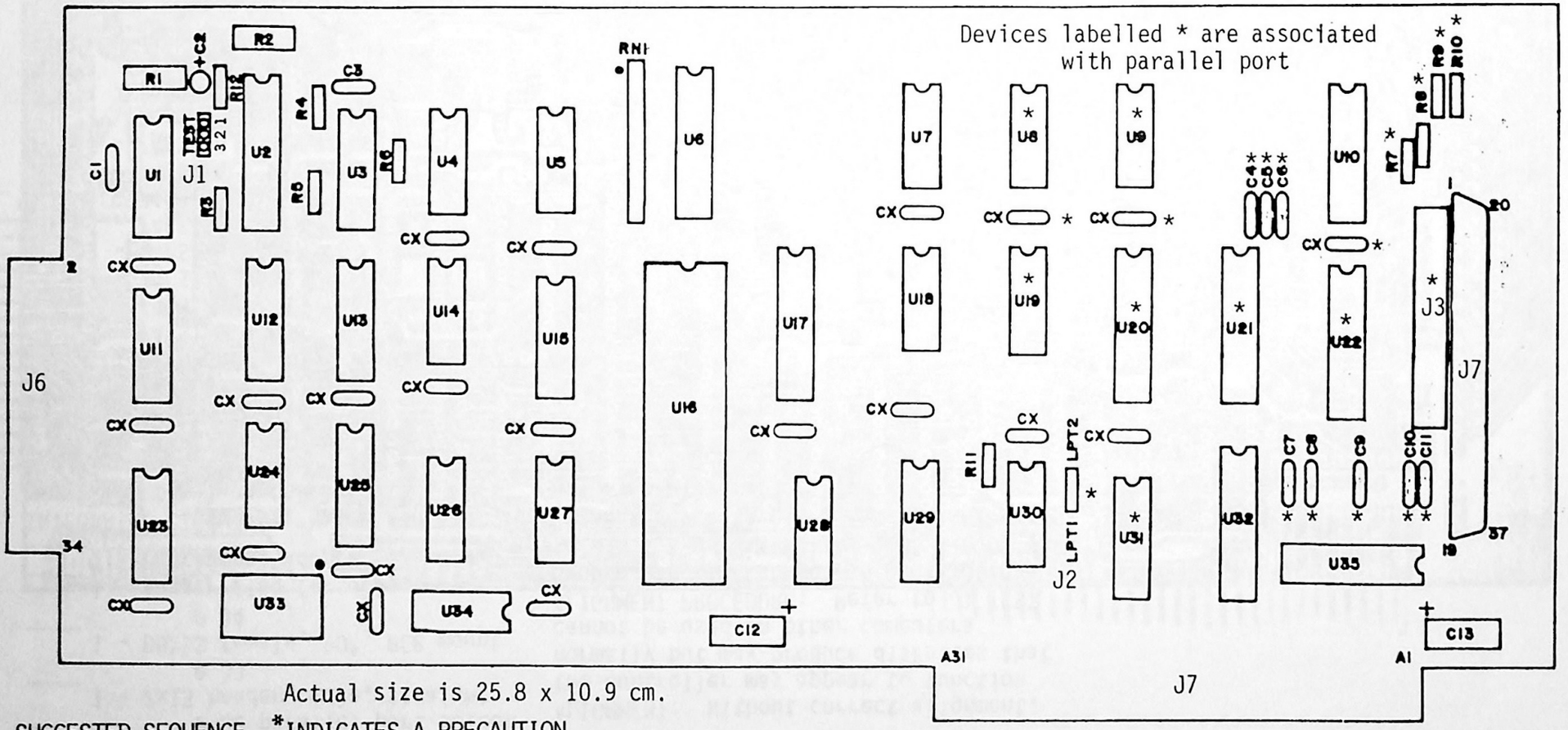
CRYSTAL Y *Fold crystal flat against the card before soldering
____ 1 - 8.0000 MHz @ XTAL

CONNECTOR
____ 1 - rear panel adaplter

*MODIFICATION: Cut "short" between feed-thru hole and land as shown on the layout

2-3 pg 1

HAL DRIVE CONTROLLER/PARALLEL PORT CARD: Supplies an interface between the computer and a) up to four 5¼" disk drives, and b) a parallel printer or other device that uses a parallel port. With power off, install in any free slot. Documentaion availabe from supplier.



Actual size is 25.8 x 10.9 cm.

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

____ 1 - 100 Ω @ R12
____ 2 - 2 KΩ @ R5,11
____ 4 - 4.7 KΩ @ R7,8,9,10
____ 1 - 12 KΩ @ R6
____ 1 - 47 KΩ @ R3
____ 1 - 68 KΩ @ R4
____ 1 - 150 Ω 10-pin SIP* @ RN1
*Match pin 1 of SIP with pin 1 (dot) on the layout

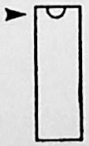
RESISTORS (continued)

____ 2 - 50 KΩ single turn Trimpot @ R1,2

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 14 - 14-pin
____ 10 - 16-pin
____ 9 - 20-pin
____ 1 - 40-pin

pin 1 ➤



CAPACITORS C

____ 2 - 47 pF @ C1,3
____ 8 - 0.0022 µF @ C4,5,6,7,8,9,10,11
____ 22 - 0.1 µF Monolithic @ CX
*Match + of the following capacitors with + on the layout
____ 1 - 0.68 µF/25V Tantalum* @ C2
____ 2 - 22 µF/16V Axial* @ C12,13

HAL DRIVE CONTROLLER/PARALLEL PORT CARD (continued)

CRYSTAL Y *Match pin 1 of oscillator with pin 1 (dot) on the layout

____ 1 - 8.0000 MHz oscillator package @ U33

CONNECTORS

____ 2 - 1x3 headers, male, straight @ J1 TEST @ J2 parallel port select

____ 1 - 2x13 header, male, straight @ J3

____ 1 - DB25S female, 90°, PCB mount @ J4

____ 1 - jumper plug for J2

____ 1 - rear panel adapter

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U18
____ 1 - 74LS02 @ U28
____ 1 - 74LS04 @ U34
____ 2 - 74LS08 @ U7,26
____ 1 - 74LS20 @ U30
____ 1 - 74LS109 @ U25
____ 1 - 74LS123 @ U3
____ 1 - 74LS125 @ U9
____ 1 - 74LS126 @ U27
____ 1 - 74LS138 @ U29
____ 1 - 74LS153 @ U13
____ 1 - 74LS155 @ U31
____ 1 - 74LS174 @ U19
____ 2 - 74LS175 @ U12,15
____ 4 - 74LS240 @ U6,10,20,32
____ 1 - 74LS244 @ U21
____ 1 - 74LS245 @ U35
____ 1 - 74LS273 @ U17
____ 1 - 74LS293 @ U24
____ 1 - 74LS374 @ U22
____ 1 - 74LS629 @ U1

INTEGRATED CIRCUITS (continued)

____ 1 - 7405 @ U8
____ 5 - 7438 @ U4,5,11,14,23
____ 1 - 765AC @ U16
____ 1 - WD1691 @ U2

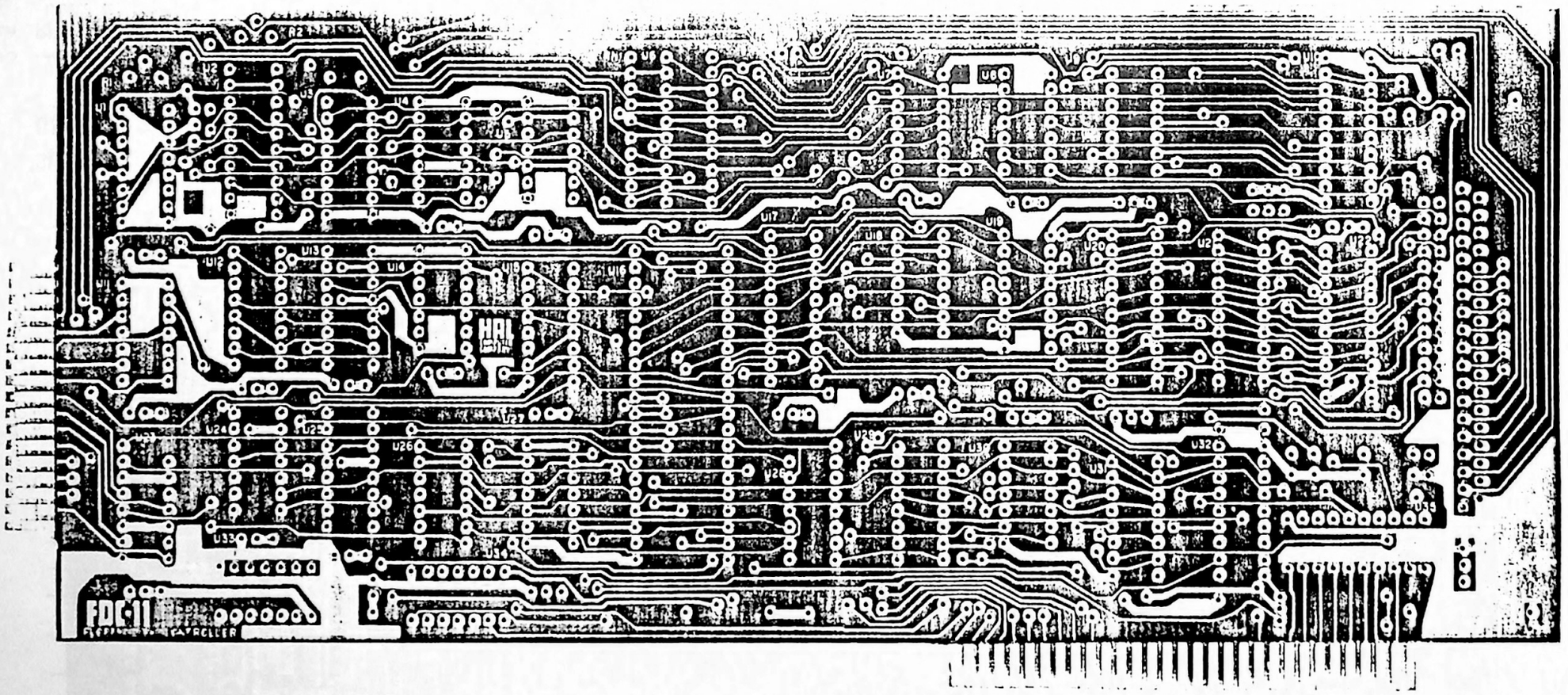
*The ICs @ U8,9,19,20,21,22,31 are associated with the parallel port

ALIGNMENT: Without correct alignment, the controller may appear to function normally but may produce diskettes that cannot be used on other computers

ALIGNMENT PROCEDURE: Refer to J1 TEST. Ground pin 2. Connect an oscilloscope to pin 1 & adjust R1 for 1.35 ± 0.05 V. Connect scope to pin 3 & adjust R2 for 4 MHz display.

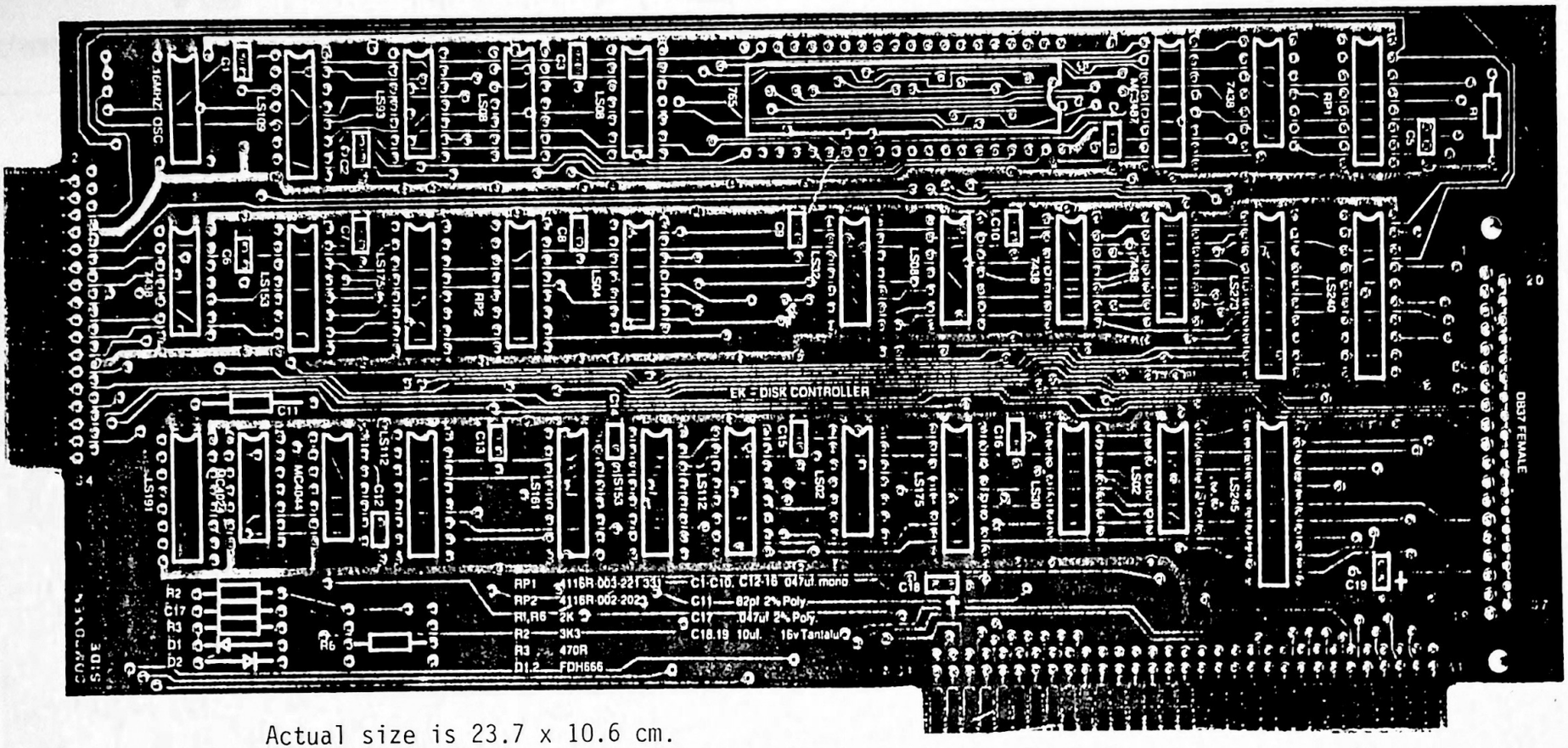
HAL DRIVE CONTROLLER/PARALLEL PORT CARD (continued)

Bare card with incomplete silk-screening:



NuScope Associates

EK DISK CONTROLLER CARD: Allows user to run up to four 5¼" floppy disc drives. With power off, install in any vacant slot. Position DIP switch on motherboard according to the number of disk drives in use.



Actual size is 23.7 x 10.6 cm.

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

DIODES D *Position banded end (cathode) of diode as shown ●→| banded end

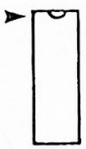
____ 2 - FDH666 @ D1,2

RESISTORS R ¼ watt, 5%

____ 1 - 470 Ω @ R3
____ 2 - 2 KΩ @ R1,6
____ 1 - 3.3 KΩ @ R2
____ 1 - 2 KΩ 16-pin DIP @ RP2
____ 1 - 220/330 Ω 16-pin DIP @ RP1

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes.

____14 - 14-pin pin 1 ➤
____13 - 16-pin
____ 3 - 20-pin
____ 1 - 40-pin



CAPACITORS C

____ 1 - 82 pF 2% Polystyrene @ C11
____ 1 - 0.047 µF 2% Polystyrene @ C17

CAPACITORS (continued)

____15 - 0.047 µF Monolithic @ C1,2,3, C4,5,6,7,8,9,10,12,13, C14,15,16
____ 2 - 10 µF/16V Tantalum* @ C18,19 *Match + of Tantalum with + on the layout

EK DISK CONTROLLER CARD (continued)

OSCILLATOR

____ 1 - 16.000 mHz

CONNECTORS

____ 1 - DC37S female, 90°, PCB mount
for two 5¼ external drives

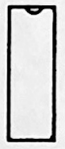
____ 1 - rear panel adapter

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 2 - 74LS02
____ 1 - 74LS04
____ 3 - 74LS08
____ 1 - 74LS30
____ 1 - 74LS32
____ 1 - 74LS93
____ 1 - 74LS109
____ 2 - 74LS112
____ 1 - 74LS153
____ 1 - 74LS161
____ 2 - 74LS175
____ 1 - 74LS191
____ 1 - 74LS240
____ 1 - 74LS245
____ 1 - 74LS273

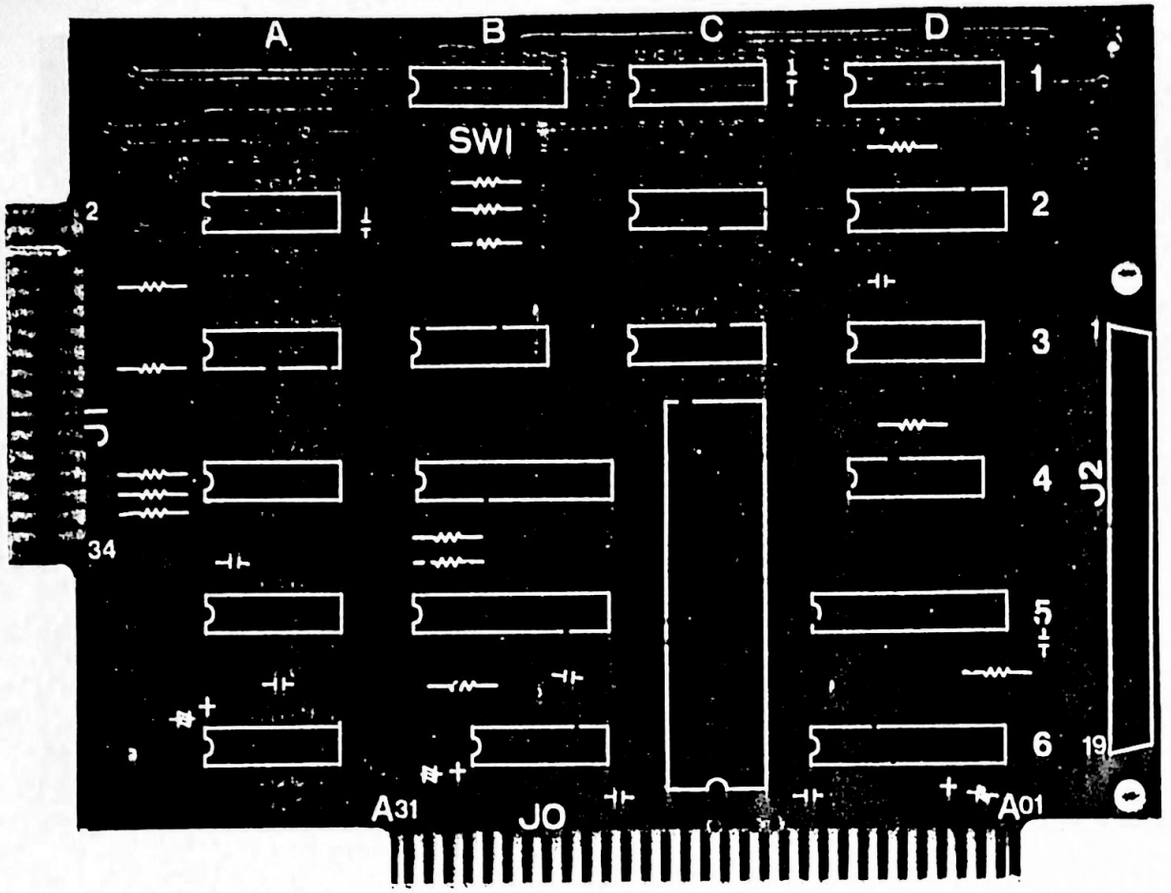
____ 1 - 74S153

____ 4 - 7438
____ 1 - MC3487
____ 1 - MC4024 (Motorola)
____ 1 - MC4044
____ 1 - D765AC



NuScope Associates

ECS-4 DISC CONTROLLER CARD: Allows user to run up to four 5¼" floppy disk drives. With power off, install in any available slot. Set DIP switches on motherboard according to the number of drives in use.



Actual size is 14.8 x 10.8 cm.

SUGGESTED SEQUENCE *INDICATES A PRECATION

RESISTORS R ¼ watt, 5%

____ 8 - 150 Ω @ co-ordiates: A2-3; three @ A4; two @ B4-5; B5-6; D3-4

____ 3 - 2 KΩ @ A3; D1-2; D5-6

____ 3 - 4.7 KΩ @ B2

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

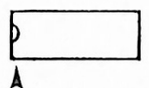
SOCKETS (continued)

____ 12 - 14-pin

____ 2 - 16-pin

____ 4 - 20-pin

____ 1 - 40-pin



CAPACITORS C

____ 9 - 0.1 µF Monolithic @

____ 3 - 3.3 µF/16V Tantalum* @ +

*Check polarity of Tantalum

SWITCH

____ 1 - 8-position DIP @ SW1

CONNECTORS

____ 1 - DB37S 37-pin female, 90°, PCB mount, @ J2

OSCILLATOR *Install oscillator in socket

____ 1 - 8.000 MHz @ A6

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

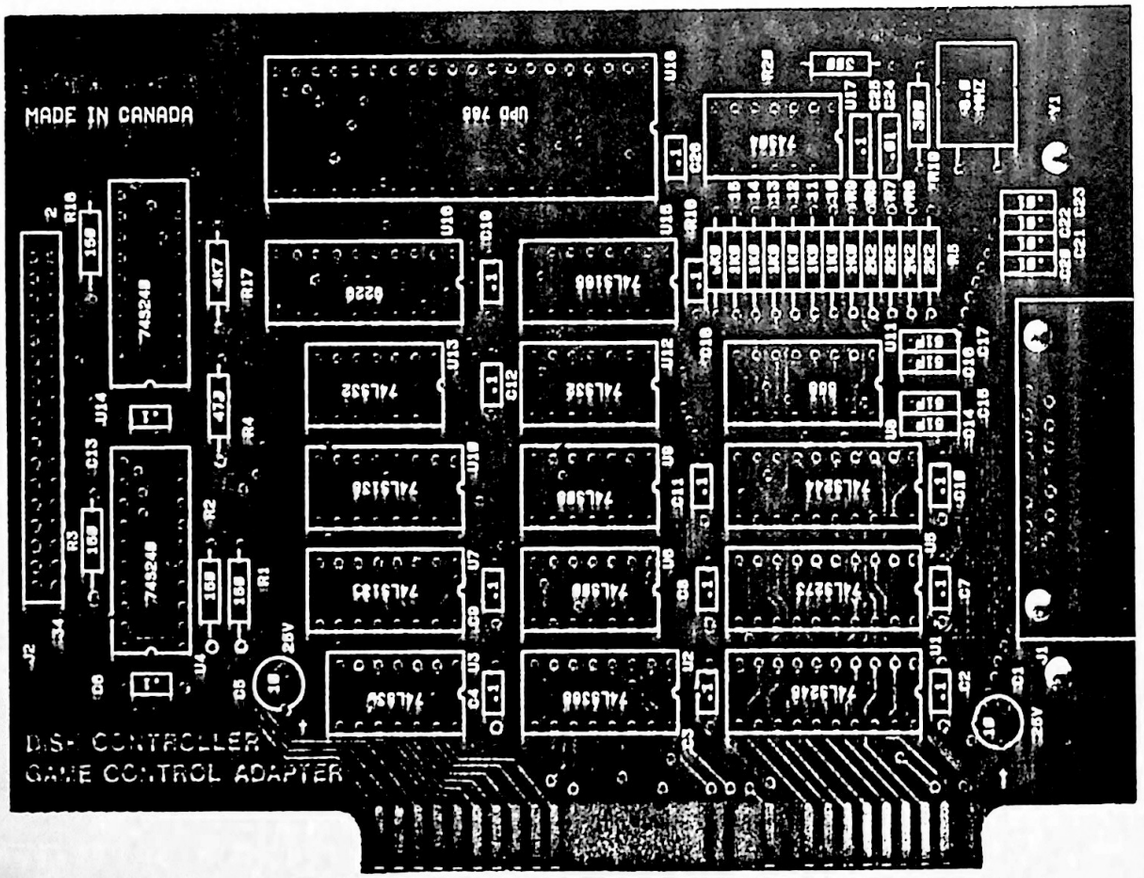
____ 1 - 74LS00 @ B3
____ 1 - 74LS02 @ A5
____ 1 - 74LS04 @ C2
____ 2 - 74LS08 @ A2,C3
____ 1 - 74LS30 @ B6
____ 1 - 74LS32 @ C1
____ 4 - 7438 or 74S38 @ A3,A4,D3,D4
____ 1 - 74LS165 @ D1
____ 1 - 74LS240 @ B4
____ 1 - 74LS245 @ D6
____ 1 - 74LS273 @ D5

____ 1 - 3487 @ D2
____ 1 - 9229 @ B5
____ 1 - 765AC @ C5

SWITCH SW1 SETTINGS:

number of drives	1	7	8
0	on	on	on
1	off	on	on
2	off	off	on
3	off	on	off
4	off	off	off

PRESTIGE DISK CONTROLLER GAME CONTROL ADAPTER CARD: Allows user to interface two 5¼" floppy disk drives. Has one game control port. Position DIP switch settings on motherboard according to the number of drives in use.



Actual size is 14.7 x 10.6 cm

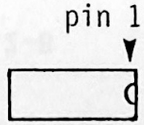
SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

____ 4 - 150 Ω @ R1,2,3,18
____ 2 - 300 Ω @ R19,20
____ 1 - 470 Ω @ R4
____ 4 - 2.2 KΩ @ R5,6,7,8
____ 8 - 1 KΩ @ R9,10,11,12,13,14,15,16
____ 1 - 4.7 KΩ @ R17

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 6 - 14-pin
____ 5 - 16-pin
____ 6 - 20-pin
____ 1 - 40-pin



CAPACITORS C

____ 4 - 51 pF @ C14,15,16,17
____ 5 - 0.01 µF @ C20,21,22,23,24
____ 15 - 0.1 µF Monolithic @ C2,3,4,6,7, C8,9,10,11,12,13,18,19,25,26
____ 2 - 10 µF/25V Tantalum* @ C1,5
*Match + of Tantalum with + on the layout

CRYSTAL Y *Fold crystal flat against the card before soldering

____ 1 - 8.000 MHz @ Y1

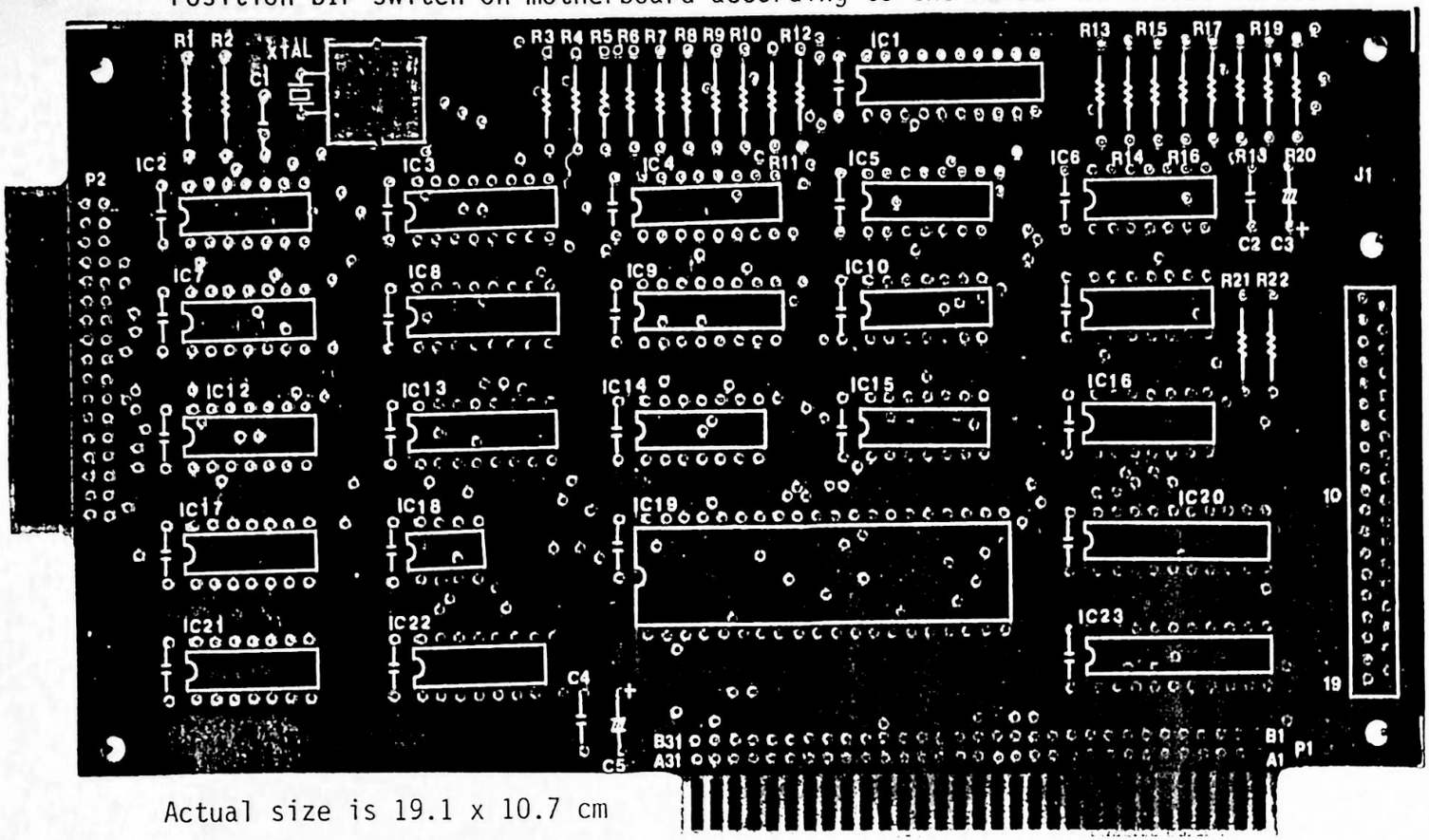
CONNECTORS

____ 1 - DA15S female, 90° @ J1 game port
____ 1 - 2x17 header, male, straight @ J2 disk controller
____ 1 - rear panel adapter

INTEGRATED CIRCUIT *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U6
____ 1 - 74LS04 @ U17
____ 1 - 74LS08 @ U9
____ 1 - 74LS30 @ U3
____ 2 - 74LS32 @ U12,13
____ 2 - 74LS138 @ U7,10
____ 1 - 74LS165 @ U15
____ 2 - 74S240 @ U4,14
____ 1 - 74LS244 @ U8
____ 1 - 74LS245 @ U1
____ 1 - 74LS273 @ U5
____ 1 - 74LS368 @ U2
____ 1 - NE558 @ U11
____ 1 - FDC9229 @ U16
____ 1 - µPD765 (NEC) or 8272 (INTEL) @ U18

SW DISK DRIVE CONTROLLER CARD: Allows user to run up to four disk drives. With power off, install in any slot. Position DIP switch on motherboard according to the number of drives in use.



Actual size is 19.1 x 10.7 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

____ 7 - 220 Ω @ R9,10,11,12,13,14,15,16
____ 11 - 330 Ω @ R1,2,3,4,5,6, R17,18,19,20
____ 4 - 2 KΩ @ R7,8,21,22

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 1 - 8-pin
____ 13 - 14-pin
____ 5 - 16-pin

pin 1

SOCKETS (continued)

____ 3 - 20-pin
____ 1 - 40-pin

CAPACITORS C

____ 1 - 47 pF @ C1
____ 25 - 0.1 µF Monolithic @ C2,4 & ⊣⊢
____ 2 - 10 µF/16V Radial* @ C3,5
*Match + of Radials with + on the layout

CRYSTAL Y *Fold crystal flat against the card before soldering

____ 1 - 8.000 MHZ @ XTAL

CONNECTORS

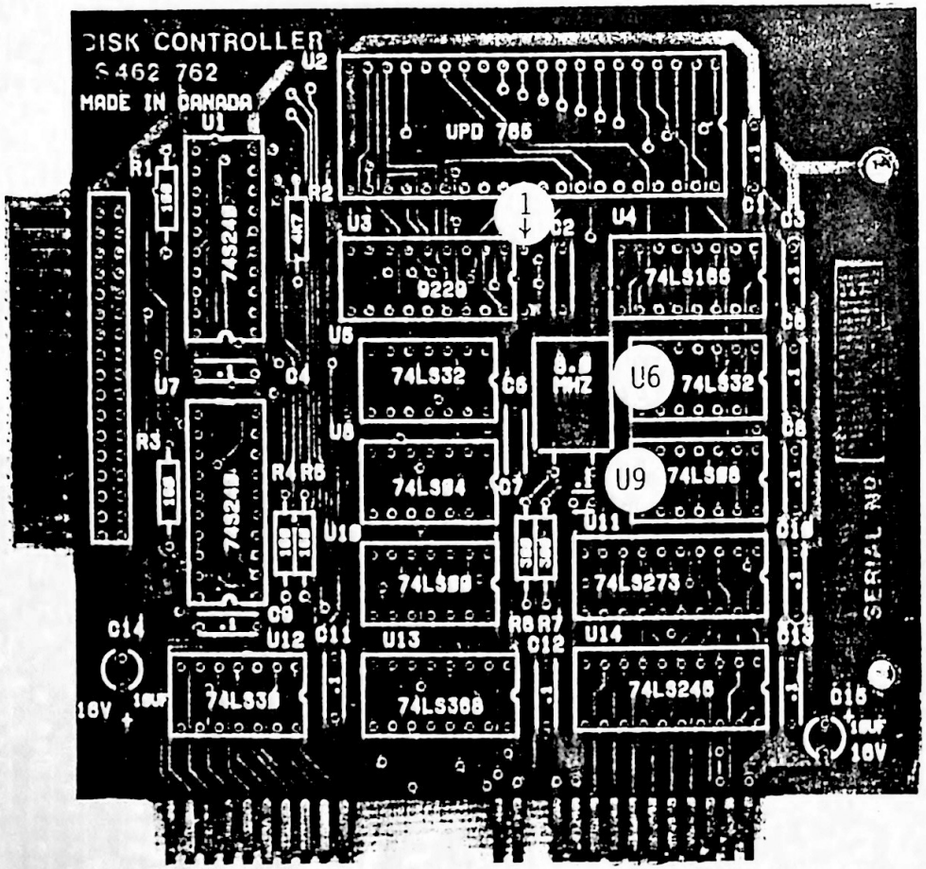
____ 1 - DC37S female, 90°
____ 1 - rear panel adapter

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on layout

____ 1 - 74LS00 @ IC12
____ 1 - 74LS02 @ IC6
____ 2 - 74LS04 @ IC2,15
____ 2 - 74LS08 @ IC5,10
____ 1 - 74LS30 @ IC22
____ 1 - 74LS32 @ IC14
____ 4 - 74LS38 @ IC11,16,17,21
____ 1 - 74LS93 @ IC7
____ 1 - 74LS109 @ IC13
____ 1 - 74LS153 @ IC9
____ 2 - 74LS175 @ IC3,8
____ 1 - 74LS240 @ IC1
____ 1 - 74LS245 @ IC23
____ 1 - 74LS273 @ IC20
____ 1 - 26LS31 @ IC4
____ 1 - WD9216 @ IC18 (8-pin)
____ 1 - 6765 @ IC19

NuScope Associates

PRESTIGE SHORT-SLOT DISK CONTROLLER CARD: Allows user to interface one or two 5¼" floppy disk drives. Card fits in "short slot". Position DIP switch settings on mother board according to the number of drives in use.



Actual size is 12.0 cm x 11.0 cm

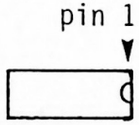
SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

____ 4 - 150 Ω @ R1,3,4,5
____ 2 - 300 Ω @ R6,7
____ 1 - 4.7 KΩ @ R2

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 6 - 14-pin
____ 2 - 16-pin
____ 1 - 18-pin
____ 4 - 20-pin*
____ 1 - 40-pin



*Note: Install a 20-pin socket @ U3

CAPACITORS C

____13 - 0.1 µF Monolithic @ C1-13
____ 2 - 10 µF/16V Tantalum @ C14,15
*Match + of Tantalums with + on the layout

CRYSTAL Y *Fold crystal flat against the card before soldering

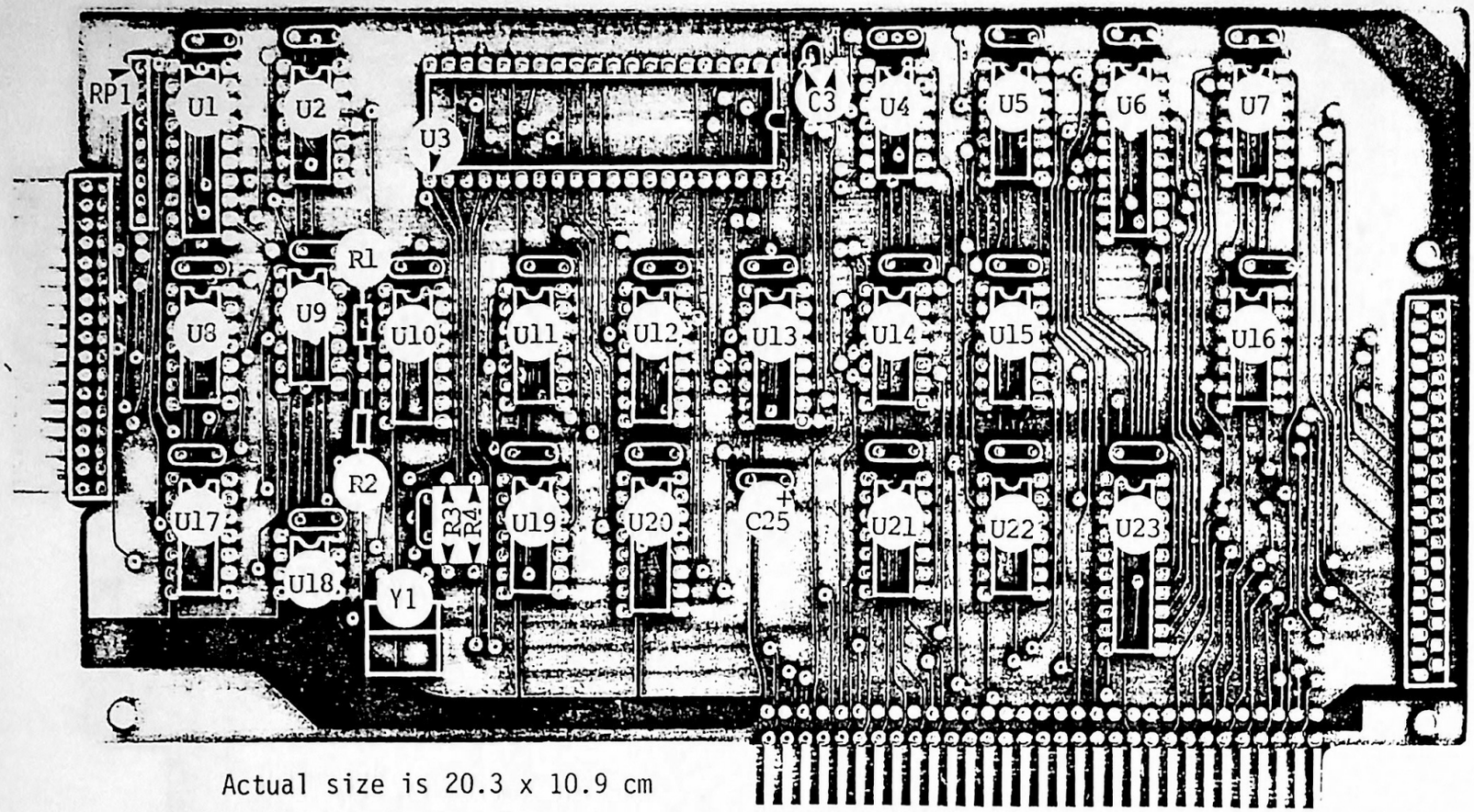
____ 1 - 8.0000 MHz @ 8.Ø MHZ

INTEGRATED SOCKETS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U10
____ 1 - 74LS04 @ U8
____ 1 - 74LS08 @ U9
____ 1 - 74LS30 @ U12
____ 2 - 74LS32 @ U5,6
____ 1 - 74LS165 @ U4
____ 2 - 74S240 @ U1,7
____ 1 - 74LS245 @ U14
____ 1 - 74LS273 @ U11
____ 1 - 74LS368 @ U13
____ 1 - FDC9229 @ U3
____ 1 - µPD765 (NEC) or 8272 (INTEL) @ U2

NuScope Associates

COLLEGE DISK CONTROLLER CARD: Allows user to run up to four disk drives. Postion DIP switches on motherboard according to the number of drives in use.



Actual size is 20.3 x 10.9 cm

CRYSTAL *Fold crystal flat against the card before soldering

____ 1 - 16.000 mHz @ Y1

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS02 @ U22
____ 2 - 74LS04 @ U15,19
____ 3 - 74LS08 @ U2,5,14
____ 1 - 74LS30 @ U21
____ 1 - 74LS32 @ U4
____ 1 - 74LS93 @ U11
____ 1 - 74LS109 @ U10
____ 1 - 74LS153 @ U20
____ 2 - 74LS175 @ U12,13
____ 1 - 74LS240 @ U1
____ 1 - 74LS245 @ U23
____ 1 - 74LS273 @ U6
____ 5 - 7438 @ U7,8,9, U16,17
____ 1 - WD9216 @ U18
____ 1 - 765AC @ U3 *Note pin 1*

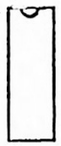
SUGGESTED SEQUENCE *INDICATES A PRECAUTION
*MODIFICATION REQUIRED ON THE SOLDER SIDE

RESISTORS ¼ watt, 5%

____ 2 - 330 Ω @ R3,4
____ 1 - 1 KΩ @ R5 *ON SOLDER SIDE
____ 2 - 2 KΩ @ R1,2
____ 1 - 10 KΩ 10-pin SIP* bussed @ RP1 *Match pin 1 of SIP with pin 1 on the layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

SOCKETS (continued) pin 1 ➤

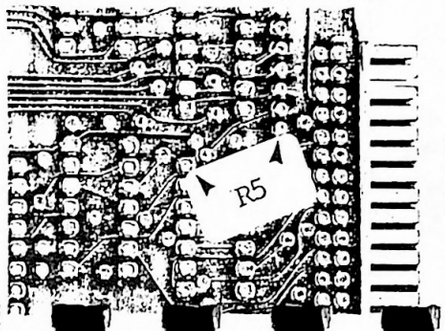


____ 1 - 8-pin
____ 14 - 14-pin
____ 4 - 16-pin
____ 3 - 20-pin
____ 1 - 40-pin *Note pin 1*

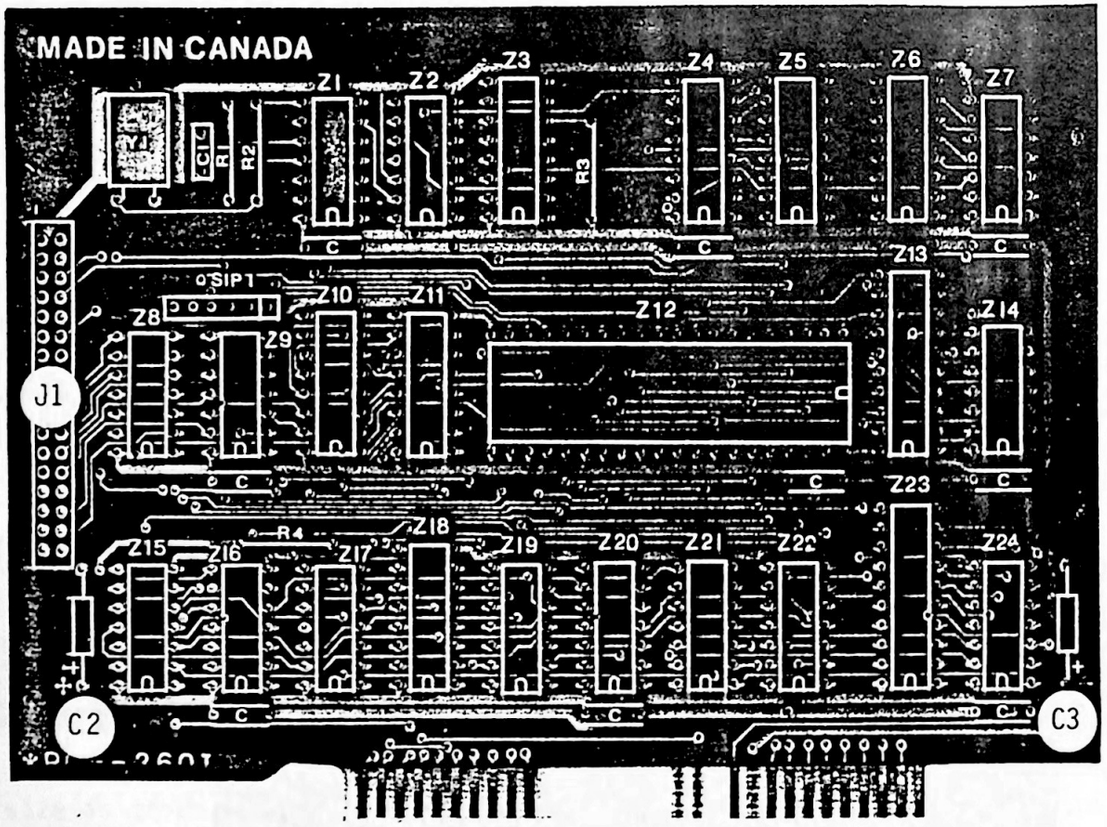
CAPACITORS C

____ 24 - 0.1 µF Monolithic @
____ 1 - 10 µF/25V Tantalum* @ C25
*Match + of Tantalum with + on layout

*MODIFICATION: On the solder side install one 1 KΩ resistor from pin 11 of RP1 to pin 14 of U8 as shown @ R5



PRELUDE DISK CONTROLLER CARD: Interface up to four 5¼" floppy disk crives. Requires firmware (one PROM). Position DIP switch on motherboard according to the number of drives in use. Schematics available from supplier.



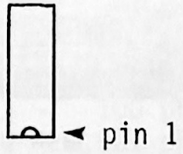
Actual size is 14.8 x 10.8 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%
____ 2 - 560 Ω @ R1,2
____ 2 - 4.7 KΩ @ R3,4
____ 1 - 150 Ω 6-pin SIP* bussed @ SIP 1
*Match pin 1 of SIP with pin 1 (square) on the layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

SOCKETS (continued)
____14 - 14-pin
____ 7 - 16-pin
____ 2 - 20-pin
____ 1 - 40-pin



CAPACITORS C
____ 1 - 0.001 µF @ C1
____ 9 - 0.1 µF Monolithic @ C
____ 2 - 3.3 µF/16V Axial* @ C2,3

Capacitors (continued)
*Match + of Axial with + on layout

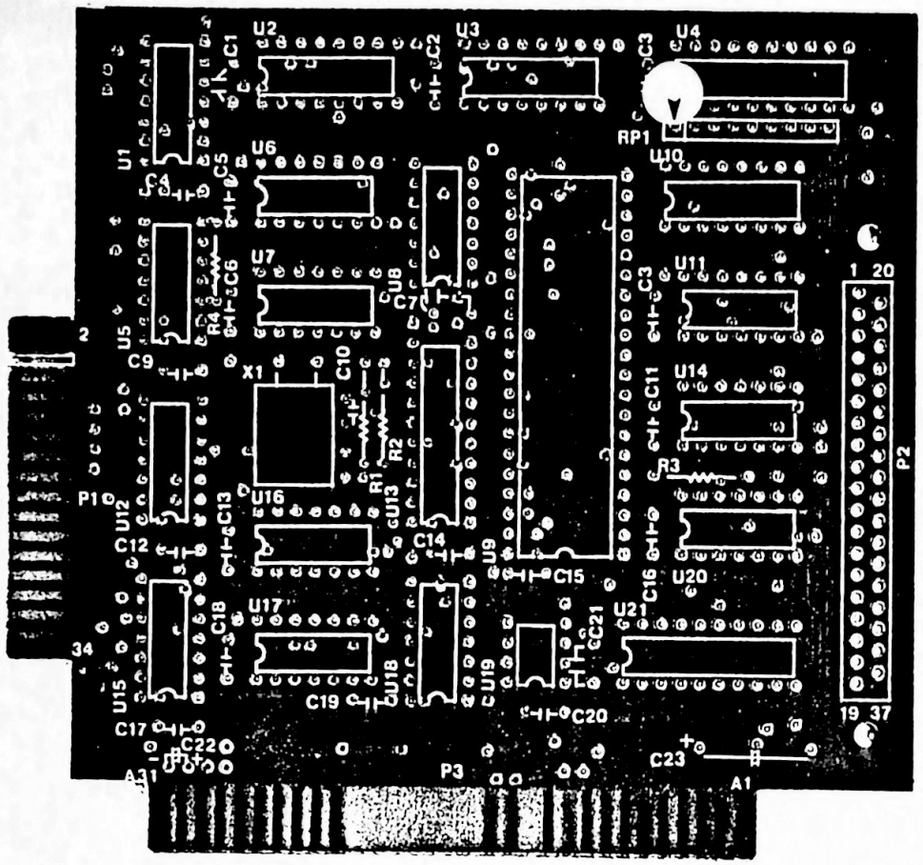
CRYSTAL Y Fold crystal flat against the card before soldering
____ 1 - 16.0000 MHz @ Y1

CONNECTORS
____ 1 - 2x17 header, male straight @ J1
____ 1 - rear panel bracket

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout
____ 1 - 7416 @ Z8
____ 1 - 74161 @ Z3
____ 1 - 74174 @ Z11
____ 1 - 74273 @ Z13
____ 1 - 74LS00 @ Z15
____ 4 - 74LS04 @ Z1,7,9,24 *Try 74S04 @ Z1
____ 1 - 74LS08 @ Z19
____ 1 - 74LS30 @ Z21
____ 2 - 74LS32 @ Z16,20
____ 1 - 74LS38 @ Z14
____ 1 - 74LS74 @ Z17
____ 1 - 74LS126 @ Z22
____ 1 - 74LS139 @ Z6
____ 1 - 74LS153 @ Z4
____ 2 - 74LS175 @ Z5,18
____ 1 - 74LS245 @ Z23
____ 1 - 74LS293 @ Z2 *Try 74LS393 @ Z2
____ 1 - 8272 @ Z12
____ 1 - 82S123 PROM @ Z10

NuScope Associates

COLLEGE II DISK CONTROLLER CARD: Short slot card. Allows user to run up to four floppy disk drives. Position DIP switches on motherboard according to the number of drives in use.



Actual size is
12.0 x 10.8 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

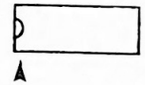
RESISTORS R ¼ watt, 5%

____ 3 - 220 Ω @ R1,2,4
____ 1 - 4.7 KΩ @ R3
____ 1 - 1 KΩ SIP, bussed @ RP1* NB pin 1

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

SOCKETS (continued)

____ 1 - 8-pin
____ 13 - 14-pin
____ 3 - 16-pin
____ 3 - 20-pin
____ 1 - 40-pin



CAPACITORS C

____ 1 - 47 pF @ C6
____ 1 - 500 pF @ C10

CAPACITORS (continued)

____ 19 - 0.1 µF @ C1-5,6-9,10-21

*Match + of the following electrolytes with + on the layout

____ 1 - 10 µF/16V Tantalum* @ C22
____ 1 - 22 µF/16V Axial* @ C23

CRYSTAL *Fold crystal flat against the card before soldering

____ 1 - 16.0000 MHz @ X1

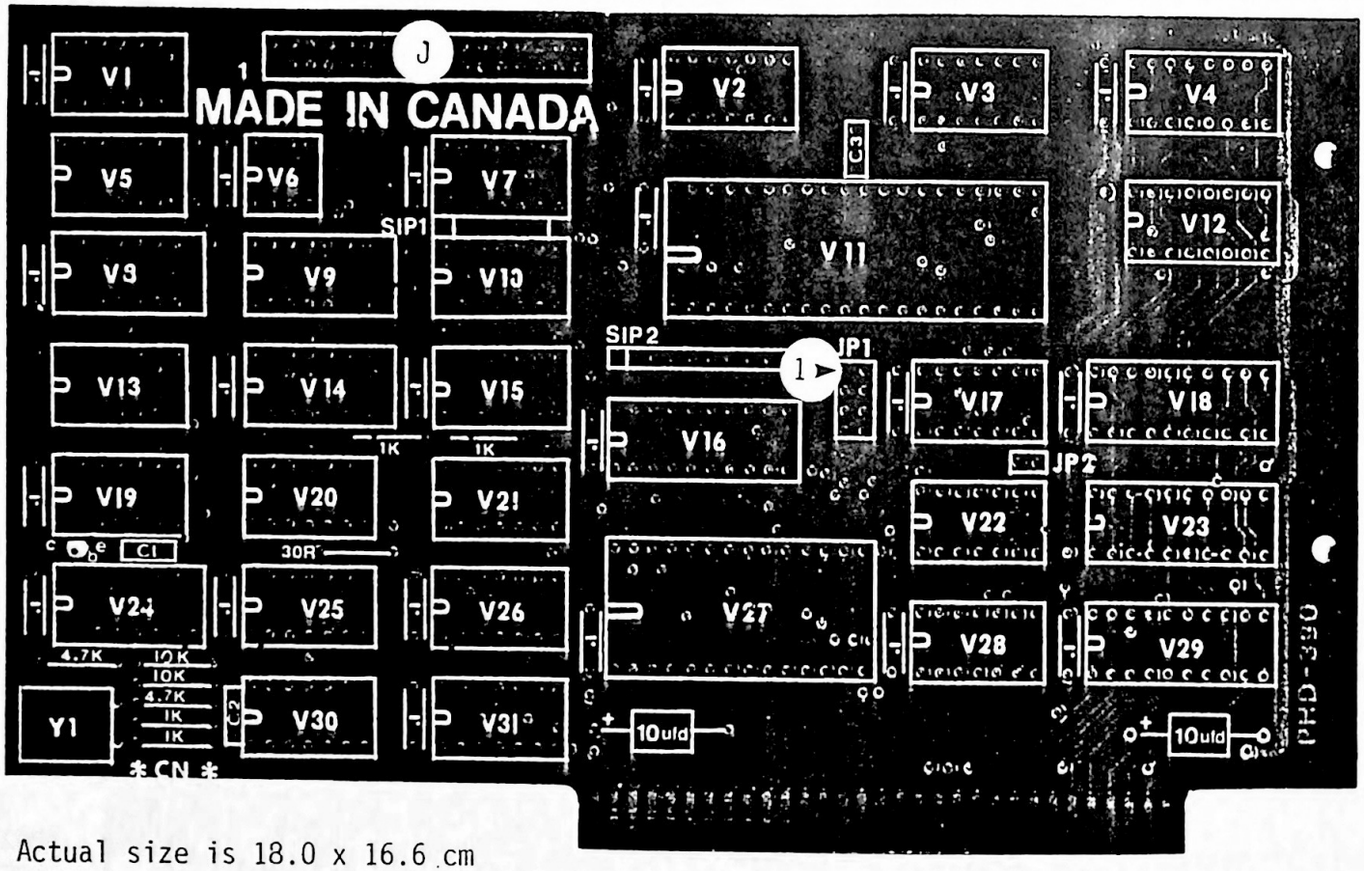
CONNECTORS

____ 1 - DC37S female, 90° @ P2
____ 1 - rear panel bracket

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U14
____ 1 - 74LS02 @ U7
____ 1 - 74LS04 @ U16
____ 2 - 74LS08 @ U11,17
____ 1 - 74LS30 @ U18
____ 1 - 74LS32 @ U20
____ 1 - 74LS38 @ U1
____ 1 - 74LS93 @ U6
____ 1 - 74LS109 @ U3
____ 1 - 74LS125 @ U8
____ 1 - 74LS175 @ U10
____ 1 - 74LS195 @ U2
____ 1 - 74LS237 @ U13
____ 1 - 74LS240 @ U4
____ 1 - 74LS245 @ U21
____ 1 - 7406 @ U12
____ 2 - 7438 @ U5,15
____ 1 - UM8326 @ U19
____ 1 - µPD765 @ U9

PRELUDE XT/AT DISK CONTROLLER CARD; Interface for either XT of AT motherboards to run either 360 K or 1.2 M byte floppy disk drives. Requires firmware (one PAL).



Actual size is 18.0 x 16.6 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

____ 1 - 30 Ω
____ 4 - 1 KΩ
____ 2 - 4.7 KΩ
____ 2 - 10 KΩ

*Match pin 1 of the following bussed SIPs with pin 1 (square) on the layout

____ 1 - 150 Ω 6-pin SIP @ SIP1
____ 1 - 4.7 KΩ 10-pin SIP @ SIP2

TRANSISTORS Q *Note ebc leads

____ 1 - 2N3906 @ ebc

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 1 - 8-pin
____ 18 - 14-pin
____ 6 - 16-pin
____ 4 - 20-pin
____ 1 - 28-pin

CAPACITORS C

____ 1 - 100 pF @ C1
____ 1 - 0.001 pF @ C2
____ 1 - 470 pF @ C3
____ 21 - 0.1 µF Monolithic @ .1
____ 2 - 10 µF/16V Tantalum* @ 10 µfd

CRYSTAL Y *Fold crystal flat against the card before soldering

____ 1 - 24.0000 MHz @ Y1

CONNECTORS

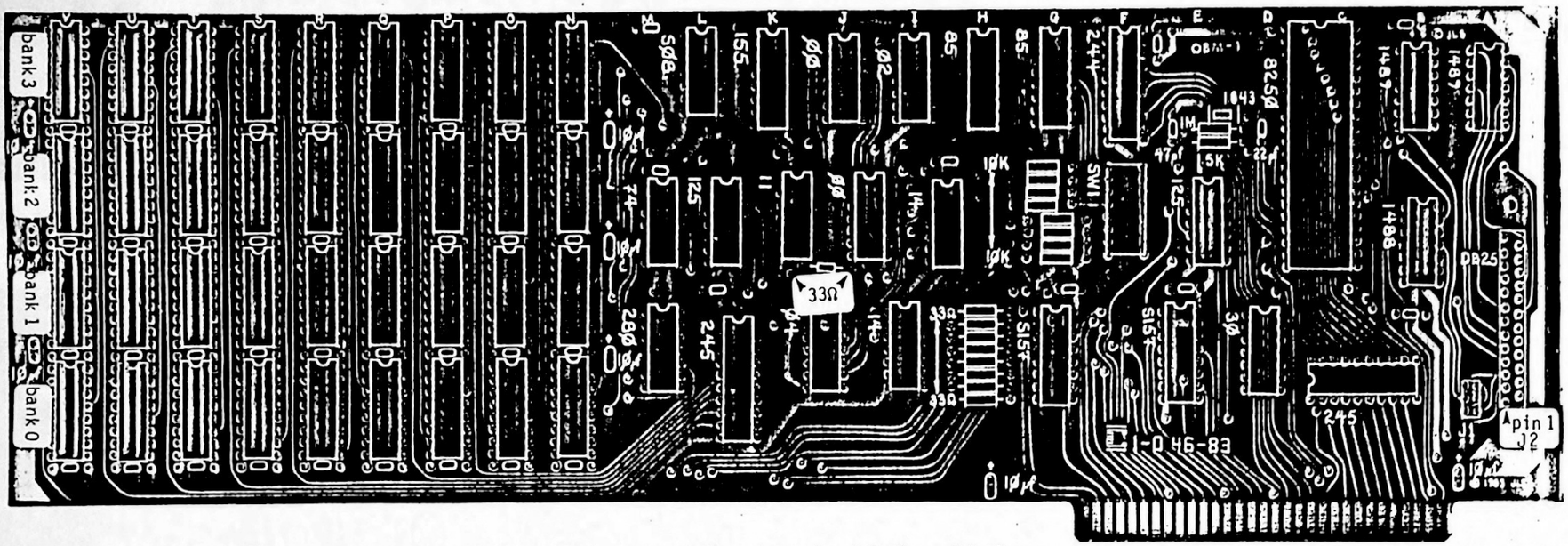
____ 1 - 2x4 header, male, straight @ JP1
____ 1 - 1x2 header, male, straight @ JP2: on=XT; off=AT
____ 1 - 2x17 header, male straight @ J

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 2 - 7438 @ V2,3,15
____ 1 - 74LS00 @ V25
____ 1 - 74LS02 @ V17
____ 1 - 74LS08 @ V21
____ 2 - 74LS14 @ V10,31
____ 2 - 74LS30 @ V26,28
____ 1 - 74LS32 @ V22
____ 1 - 74LS93 @ V1
____ 1 - 74LS123 @ V24
____ 1 - 74LS125 @ V19
____ 2 - 74LS174 @ V4,12
____ 1 - 74LS175 @ V5
____ 1 - 74LS195 @ V9
____ 1 - 74LS196 @ V20
____ 1 - 74LS245 @ V29
____ 1 - 74LS367 @ V8
____ 2 - 74LS373 @ V18,23

____ 1 - 74S00 @ V7
____ 1 - 74S04 @ V30
____ 1 - 74S74 @ V13
____ 1 - 74S112 @ V14
____ 1 - FDC9216 @ V6 Data sep.
____ 1 - µPD765 @ V11
____ 1 - 16L8 PAL @ V16
____ 1 - 2764 EPROM @ V27

JLS OBM-1 MEMORY/SERIAL CARD: Allows user to add a) 64K, 128K, 192K, or 256K bytes of dynamic RAM, and b) one RS-232 serial port using the optional ICs indicated in the parts list, to the motherboard. Schematics are available from the supplier.



Layout is reduced. Actual size is 32.9 x 10.8 cm.

SUGGESTED SEQUENCE *INDICATES A PRECAUTION *MODIFICATION REQUIRED

RESISTORS R ¼ watt, 5%

____ 9 - 33 Ω *Note position of one of the resistors on the layout
____ 1 - 1.5 KΩ
____ 8 - 10 KΩ
____ 1 - 1 MΩ

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____16 - 14-pin
____41 - 16-pin
____ 3 - 20-pin
____ 1 - 40-pin

pin 1 ➤

CAPACITORS C

____ 1 - 22 pF
____ 1 - 47 pF
____45 - 0.1 µF Monolithic @ ○
____ 8 - 10 µF/16V Tantalum *Match + with + on the layout

CRYSTAL Y *Fold crystal flat against the card before soldering

____ 1 - 1.8432 MHz @ 1.843

SWITCH

____ 1 - 8-position DIP @ SW1

CONNECTORS

____ 1 - DB25P male, 90°, PCB mount @ J2
____ 1 - rear panel adapter
____ 1 - 2x3 header, male, straight @ J1
Strap J1 as follows:

i FOR MODEM

strap { : : }strap
: :

ii FOR TERMINAL

: :
strap { : : }strap

JLS OBM-1 MEMORY/SERIAL CARD (continued):

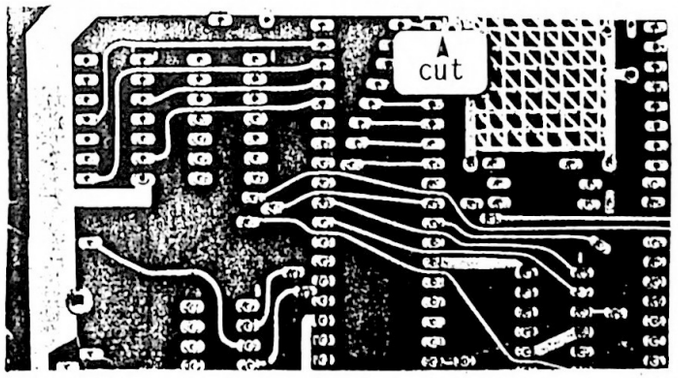
INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 2 - 74LS00
____ 1 - 74LS02
____ 1 - 74LS04
____ 1 - 74S08* (or 74LS08)
____ 1 - 74LS11
____ 2 - 74LS14
____ 1 - 74LS30
____ 1 - 74LS74
____ 2 - 74LS85
____ 2 - 74LS125 (optional)
____ 1 - 74LS155
____ 1 - 74LS244
____ 2 - 74LS245
____ 1 - 74LS280* (or 74S280)
____ 2 - 74S157 (no substitute)
____ 1 - 1488 (optional)
____ 2 - 1489 (optional)
____ 1 - 8250B (optional)
____ 36 - 4164 dynamic RAM, 200 ns

If parity error exists, substitute
74LS08 for 74S08
74S280 for 74LS280

MODIFICATION: *ON THE SOLDER SIDE

____ cut trace between pin 1 of 8250 and ground on the solder side as shown



SWITCH SW1 SETTINGS:

The switch, SW-1, located at co-ordinates 2-F, addresses memory anywhere in a one megabyte field through a continuous bank. Set the switches according to the following protocol:

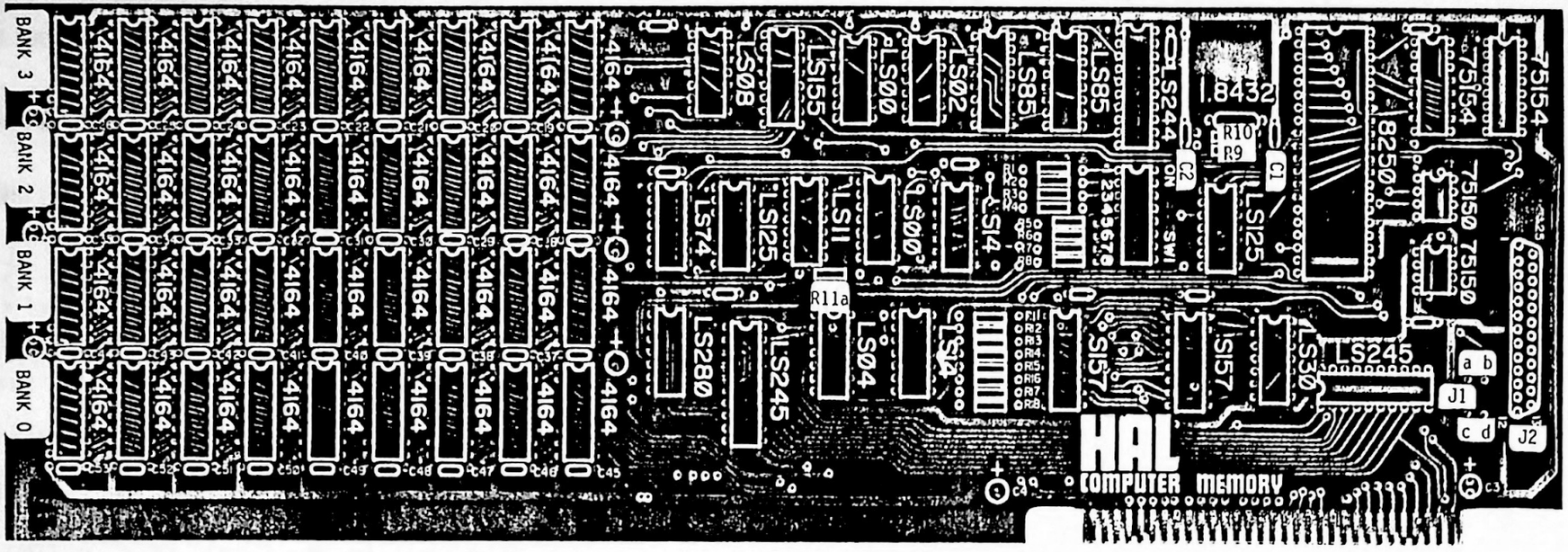
starting bank	starting address	settings 1	2	3	4	ending bank	ending address	settings 5	6	7	8
Ø	ØK	on	on	on	on	Ø	64K	on	on	on	on
1	64K	off	on	on	on	1	128K	off	on	on	on
2	128K	on	off	on	on	2	192K	on	off	on	on
3	192K	off	off	on	on	3	256K	off	off	on	on

EXAMPLE 1: for ØK to 64K bytes (one bank)
set 1, 2, 3, 4 to on; set 5, 6, 7, 8 to on

EXAMPLE 2; for ØK to 256K bytes (four banks)
set 1, 2, 3, 4 to on; set 5, 6 off & 7, 8 on

*The motherboard switch settings (SW2) must be set accordingly.

HAL MEMORY/SERIAL CARD: Allows user to add: a) 64K, 128K, 192K, or 256K bytes of dynamic RAM, and b) one RS-232 serial port (using the optional ICs indicated in the parts list), to the motherboard. Documentation and schematics are available from the supplier.



SUGGESTED SEQUENCE *INDICATES A PRECAUTION Layout is reduced. Actual size is 32.8 x 11.7 cm.

RESISTORS R ¼ watt, 5%

____ 9 - 33 Ω @ R11a,11,12,13,14,15 R16,17,18
____ 1 - 1.5 KΩ @ R9
____ 8 - 10 KΩ @ R1,2,3,4,5,6,7,8
____ 1 - 1 MΩ @ R10

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 2 - 8-pin
____ 12 - 14-pin
____ 43 - 16-pin
____ 3 - 20-pin
____ 1 - 40-pin

pin 1 ➤

CAPACITORS C

____ 1 - 22 pF @ C1
____ 1 - 47 pF @ C2
____ 45 - 0.1 µF Monolithic @ ·○·
____ 8 - 10 µF/16V Tantalum *Match + with + on the layout

@

CRYSTAL *Fold crystal flat against the card before soldering

____ 1 - 1.8432 MHz @ 1.8432

SWITCH

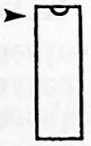
____ 1 - 8-position DIP @ SW1

CONNECTORS

____ 1 - DB25, male, 90°, PCB mount @ J2
____ 4 - jumper pins, straight @ J1
i for modem connection:
jumper a to c,
& b to d
ii for terminal connection:
jumper a to d,
& b to c
____ 1 - rear panel adapter

HAL MEMORY/SERIAL CARD (continued)

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout



____ 2 - 74LS00
____ 1 - 74LS02
____ 1 - 74LS04
____ 1 - 74LS08 (74S08)
____ 1 - 74LS11
____ 2 - 74LS14
____ 1 - 74LS30 (optional)
____ 1 - 74LS74
____ 2 - 74LS85
____ 2 - 74LS125
____ 1 - 74LS155
____ 1 - 74LS244
____ 2 - 74LS245
____ 1 - 74LS280 *use 74S280 if parity error esists
____ 2 - 74S157
____ 2 - 75150 (optional)
____ 2 - 75154 (optional)
____ 1 - 8250B (optional)
____ 36 - 4164 dynamic RAM, 200ns

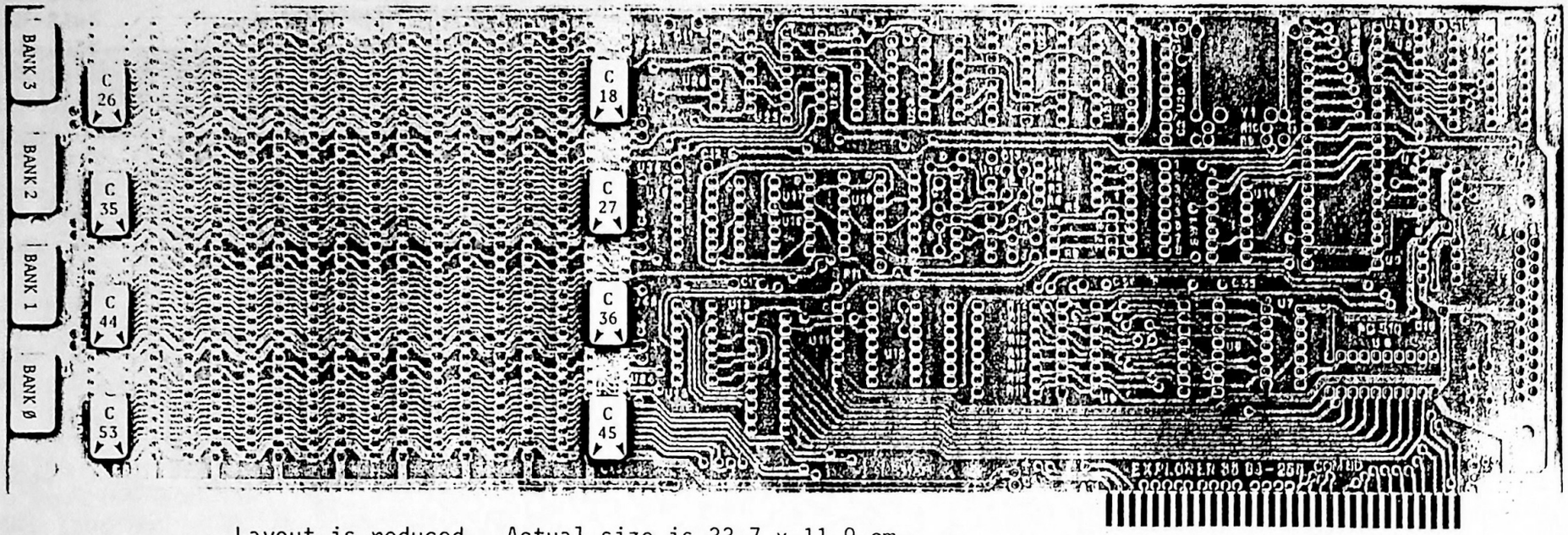
SWITCH SETTINGS - MEMORY BOARD SWITCH

Switch SW1 is used to set the memory anywhere in the allowable one megabyte field in a continuous 64k to 256k block. Switch posistions 1 to 4 indicate the starting 64k bank number (starting with bank 0), and switch positions 5 to 8 indicate the highest 64k bank in use.

Note that the motherboard switch SW2 must be set to agree with the memory board switch settings.

Memory Range	Starting Bank	Switch Positions 1	2	3	4	Ending Bank	Switch Positions 5	6	7	8
0k-64k	0	ON	ON	ON	ON	0	ON	ON	ON	ON
64k-128k	1	OFF	ON	ON	ON	1	OFF	ON	ON	ON
128k-192k	2	ON	OFF	ON	ON	2	ON	OFF	ON	ON
192k-256k	3	OFF	OFF	ON	ON	3	OFF	OFF	ON	ON
256k-320k	4	ON	ON	OFF	ON	4	ON	ON	OFF	ON
320k-384k	5	OFF	ON	OFF	ON	5	OFF	ON	OFF	ON
384k-448k	6	ON	OFF	OFF	ON	6	ON	OFF	OFF	ON
448k-512k	7	OFF	OFF	OFF	ON	7	OFF	OFF	OFF	ON
512k-576k	8	ON	ON	ON	OFF	8	ON	ON	ON	OFF
576k-640k	9	OFF	ON	ON	OFF	9	OFF	ON	ON	OFF
640k-704k	10	ON	OFF	ON	OFF	10	ON	OFF	ON	OFF
704k-768k	11	OFF	OFF	ON	OFF	11	OFF	OFF	ON	OFF
768k-832k	12	ON	ON	OFF	OFF	12	ON	ON	OFF	OFF
832k-896k	13	OFF	ON	OFF	OFF	13	OFF	ON	OFF	OFF
896k-960k	14	ON	OFF	OFF	OFF	14	ON	OFF	OFF	OFF
960k-1024k	15	OFF	OFF	OFF	OFF	15	OFF	OFF	OFF	OFF

EXPLORER MEMORY/SERIAL CARD: Allows user to add: a) 64K, 128K, 192K, or 256K bytes of dynamic RAM, and b) one RS232 serial port (using optional ICs shown in the parts list), to the motherboard.



Layout is reduced. Actual size is 33.7 x 11.9 cm

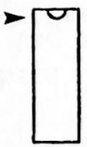
SUGGESTED SEQUENCE *INDICATES A PRECAUTION *SOLDER HOLES ARE LARGER THAN PLATED-THRU HOLES

RESISTORS R ¼ watt, 5%

____ 9 33 Ω @ R11,12,13,14,15,16, R17,18,19
____ 1 - 1.5 KΩ @ R9
____ 8 - 10 KΩ @ R1,2,3,4,5,6,7,8
____ 1 - 1 MΩ @ R10

SOCKETS *Match pin 1 of sockets with pin 1 (dot) on the layout. Check that ALL pins have passed thru ALL holes before soldering

____ 2 - 8-pin
____ 12 - 14-pin
____ 43 - 16-pin
____ 3 - 20-pin
____ 1 - 40-pin

pin 1 ➤ 

CAPACITORS C

____ 1 - 22 pF @ C1
____ 1 - 47 pF @ C2
____ 45 - 0.1 µF Monolithic @ C11,12,13,14, C15,16,17,54,55
C18 to 26 between sockets of BANKs 3 & 2
C27 to 35 between sockets of BANKs 2 & 1
C36 to 44 between sockets of BANKs 1 & Ø
C45 to 53 below sockets of BANK Ø
____ 8 - 10 µF/16V Tantalum* @ C3,4,5,6,7, C8,9,10
*Match + of Tantalums with + on the layout

CRYSTAL Y *Fold crystal flat against the card before soldering. Solder the body of the crystal to the grounding pads

____ 1 - 1.8432 MHz @ Y1

SWITCH

____ 1 - 8-position DIP @ SW1

CONNECTORS

____ 1 - DB25P 90°, male, PCB mount @ J2
____ 4 - jumper pins, straight @ K,L
for modem connection
jumper 1 to 2 & 3 to 4
for terminal connection
jumper 2 to 3 & 1 to 4
____ 1 - rear panel adapter

EXPLORER MEMORY/SERIAL CARD (continued):

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 (dot) on the layout

____ 2 - 74LS00 @ U16,24
____ 1 - 74LS02 @ U23
____ 1 - 74LS04 @ U11
____ 1 - 74LS08 @ U26 (or 74S08)
____ 1 - 74LS11 @ U17
____ 2 - 74LS14 @ U10,15
†____ 1 - 74LS30 @ U7
____ 1 - 74LS74 @ U19
____ 2 - 74LS85 @ U21,22
____ 2 - 74LS125 @ U14,18
____ 1 - 74LS155 @ U2,5
____ 1 - 74LS244 @ U20
____ 2 - 74LS245 @ U6,12
____ 1 - 74LS280 @ U13*
____ 2 - 74S157 @ U8,9
†____ 2 - 75150 @ U4,5
†____ 2 - 75154 @ U1,2
†____ 1 - 8250B @ U3
____36 - 4164 Dynamic RAM, 200 ns @ U27 to 62

ICs marked † are optional (serial port)

*Replace 74LS280 @ U13 with 74S280 if parity error exists

SWITCH SETTINGS

The switch SW-1, located at co-ordinates 2-F, addresses memory anywhere in a one megabyte field through a continuous bank. Set the switches according to the following protocol:

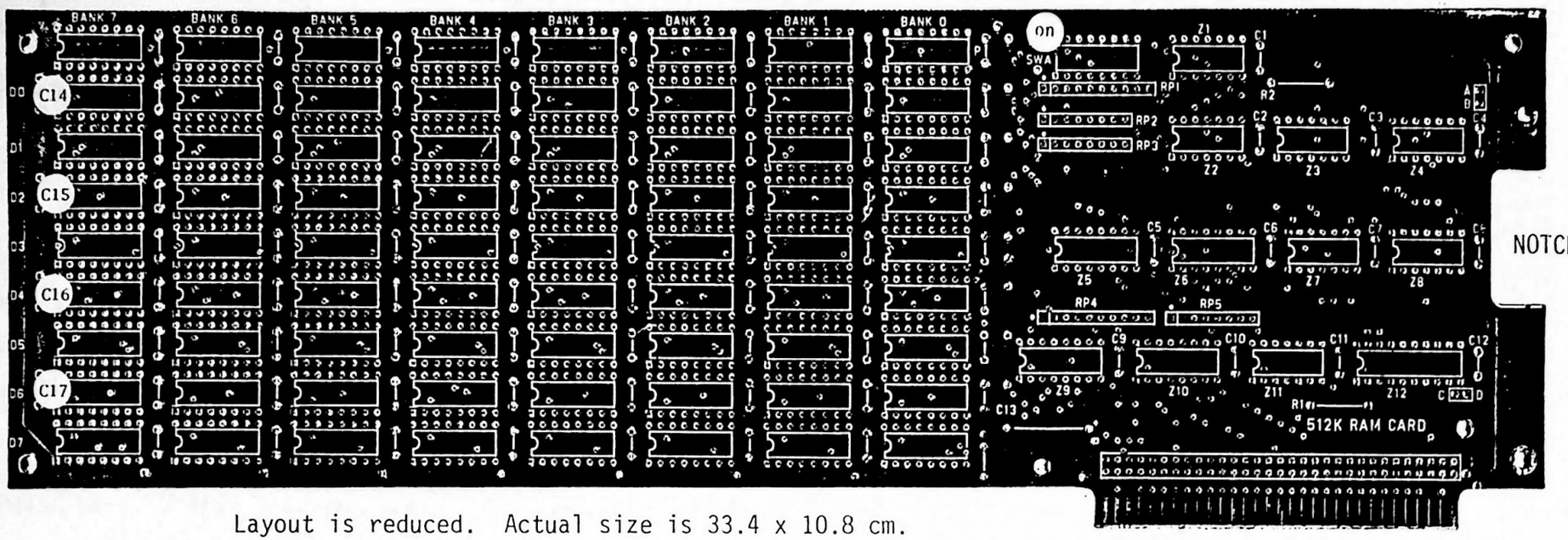
starting bank	starting address	settings 1	2	3	4	ending bank	ending address	settings 5	6	7	8
Ø	ØK	on	on	on	on	Ø	64K	on	on	on	on
1	64K	off	on	on	on	1	128K	off	on	on	on
2	128K	on	off	on	on	2	192K	on	off	on	on
3	192K	off	off	on	on	3	256K	off	off	on	on

EXAMPLE 1: for ØK to 64K bytes (one bank)
set 1, 2, 3, 4 to on; set 5, 6, 7, 8 to on

EXAMPLE 2; for ØK to 256K bytes (four banks)
set 1, 2, 3, 4 to on; set 5, 6 off & 7, 8 on

*Motherboard switch SW2 must be set to agree with the memeory switch settings.

512K RAM CARD: Allows user to add 512 K bytes of dynamic RAM in steps of 64 K bytes. Starting address is Ø K. Modifications (one cut and two jumpers) are required to start at 256 K. Set SWA according to the number of banks in use. Requires firmware (one 16-pin PROM). Documentation & schematics available from supplier. ID by "notch".



Layout is reduced. Actual size is 33.4 x 10.8 cm.

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

____ 2 - 33 Ω @ R1,2

*Match pin 1 of the following SIP resistors with pin 1 (dot) on the layout

____ 1 -330 Ω 10-pin SIP bussed @ RP1

____ 3 - 22 Ω 4-resistor SIP isolated @ RP2,3,5

____ 1 - 22 Ω 5-resistor SIP isolated @ RP4

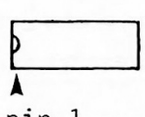
SOCKETS *Match pin 1 of sockets with pin 1 (square pad) on the layout. Check that ALL pins have passed thru ALL holes before soldering

SOCKETS (continued)

____ 6 - 14-pin

____77 - 16-pin

____ 1 - 20-pin



CAPACITORS C

____16 - 0.1 µF Monolithic @ C1 to 17

____72 - 0.1 µF Monolithic @ o—o

____ 1 - 15 µF/25V Axial* @ C13

*Match + of axial with + on the layout

SWITCH

____ 1 - 8-position DIP @ SWA

CONNECTORS

____ 2 - 2-pin header, male @ AB & CD

*not equipped

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS11 @ Z7 *Z6 is not equipped

____ 1 - 74LS30 @ Z1

____ 1 - 74LS74 @ Z4

____ 1 - 74LS125 @ Z11

____ 1 - 74LS245 @ Z12

____ 1 - 74S00 @ Z2

____ 1 - 74S74 @ Z3

____ 2 - 74S158 @ Z9,10

____ 1 - 74S280 @ Z8

____ 1 - 18S030 PROM @ Z5 (T.I.)

____72 - 4164 RAM, 200 ns in steps of 64 K (nine 4164 ICs) @ BANKS Ø,1, 2,3,4,5,6,7

512 K RAM CARD (continued)

Switch settings must correspond to the number of banks of memory. Starting address of 512 K RAM card is Ø K.

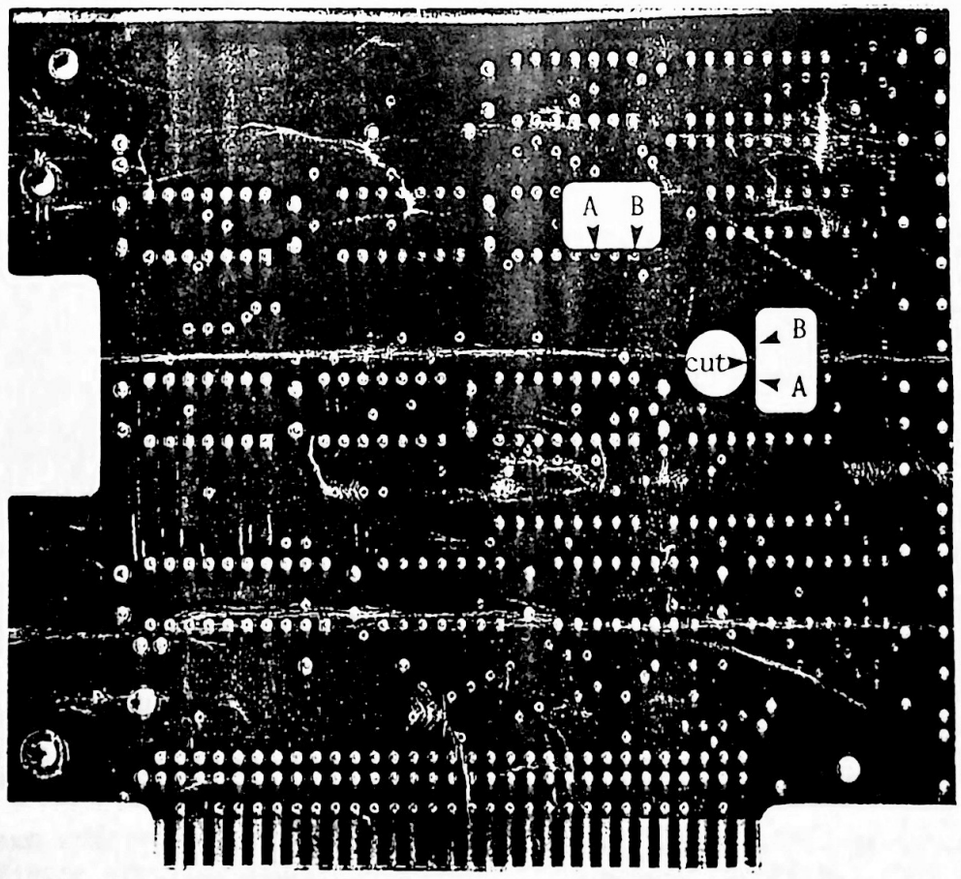
BANK	SWA SETTINGS
Ø	1 on
Ø,1	1,2 on
Ø,1,2	1,2,3 on
Ø,1,2,3	1,2,3,4 on
etc	etc
Ø to 7	all on

MODIFICATIONS are required to start at 256 K

ON SOLDER SIDE: refer to following layout:

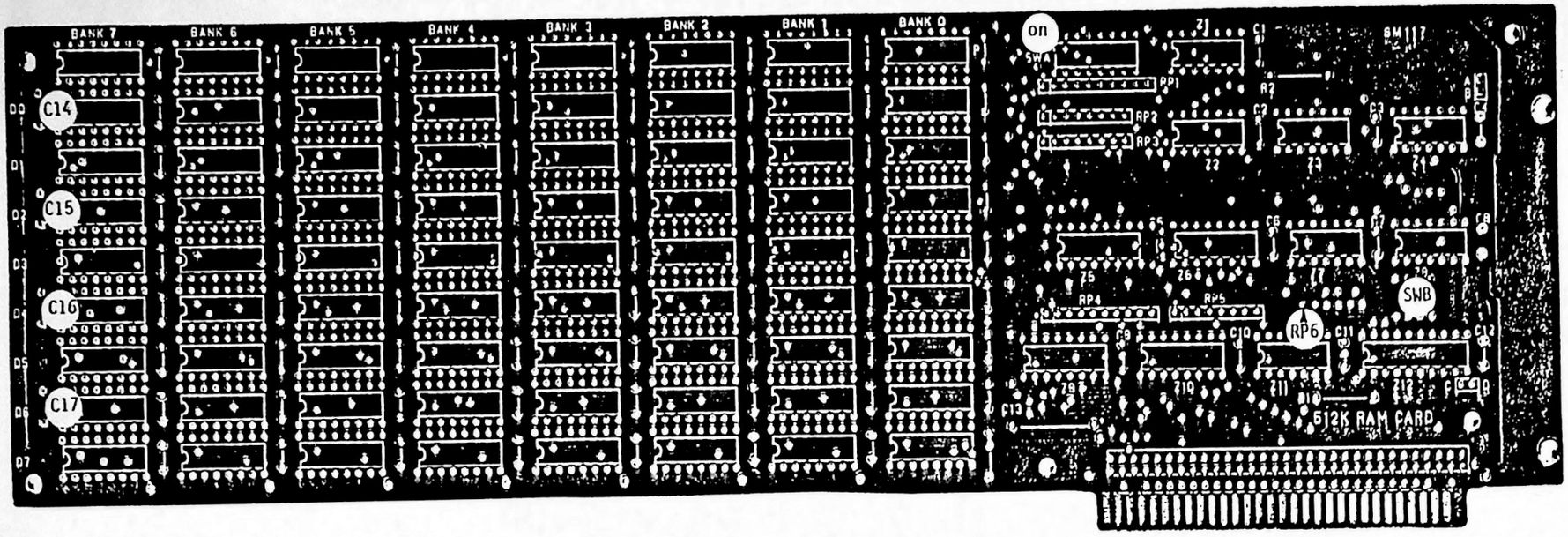
a) cut trace between pin 12 of Z5 and plated-thru hole directly above
b) strap pin 12 (A) of Z5 to pin 3 (A) of Z2
c) strap plated-thru hole (B) to pin 1 (B) of Z2

A PORTION OF THE SOLDER SIDE (close to actual size)



NuScope Associates

SELECTABLE 512 K RAM CARD: Allows user to add 512 K of dynamic RAM in steps of 64 K bytes. SWA switch selects number of banks in use; SWB switch selects starting address (from Ø K). Requires firmware (one 20-pin mapping PROM). Documentation and schematics are available from the supplier. Distinguished from 3-4A by "no-notch" at right.



SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

____ 2 - 33 Ω @ R1,2

*Match pin 1 of the following SIP resistors with pin 1 (dot) on the layout

____ 1 - 330 Ω 10-pin SIP bussed @ RP1

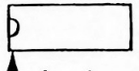
____ 1 - 4.7 KΩ 6-pin SIP bussed @ RP6

____ 3 - 22 Ω 4-resistor isolated SIP @ RP2,3,5

____ 1 - 22 Ω 5-resistor isolated SIP @ RP4

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

SOCKETS (continued)



____ 6 - 14-pin

____ 76 - 16-pin

____ 1 - 20-pin* @ Z5 for 20-pin PROM*

____ 1 - 20-pin @ Z12

CAPACITORS C

____ 16 - 0.1 µF Monolithic @ C1 to C17* *except C13

____ 72 - 0.1 µF Monolithic @ ⚬—⚬

____ 1 - 15 µF/25V axial* @ C13 *Match + of axial with + on the layout

SWICHES

____ 1 - 8-position DIP @ SWA

____ 1 - 4-position DIP @ SWB

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS11 @ Z7 *Z6 is not equipped

____ 1 - 74LS30 @ Z1

____ 1 - 74LS74 @ Z4

____ 1 - 74LS125 @ Z11

____ 1 - 74LS245 @ Z12

____ 1 - 74S00 @ Z2

____ 1 - 74S74 @ Z3

____ 2 - 74S158 @ Z9,10

____ 1 - 74S280 @ Z8

____ 1 - 28L22 PROM (T.I.) @ Z5

____ 72 - 4164 RAM, 200 ns @ BANKS Ø,1,2,3,4,5,6,7

HEADERS @ AB & CD are not equipped

SELECTABLE 512 K RAM CARD: (continued)

SWITCH SETTINGS:
SWA: Set according to the number of banks in use

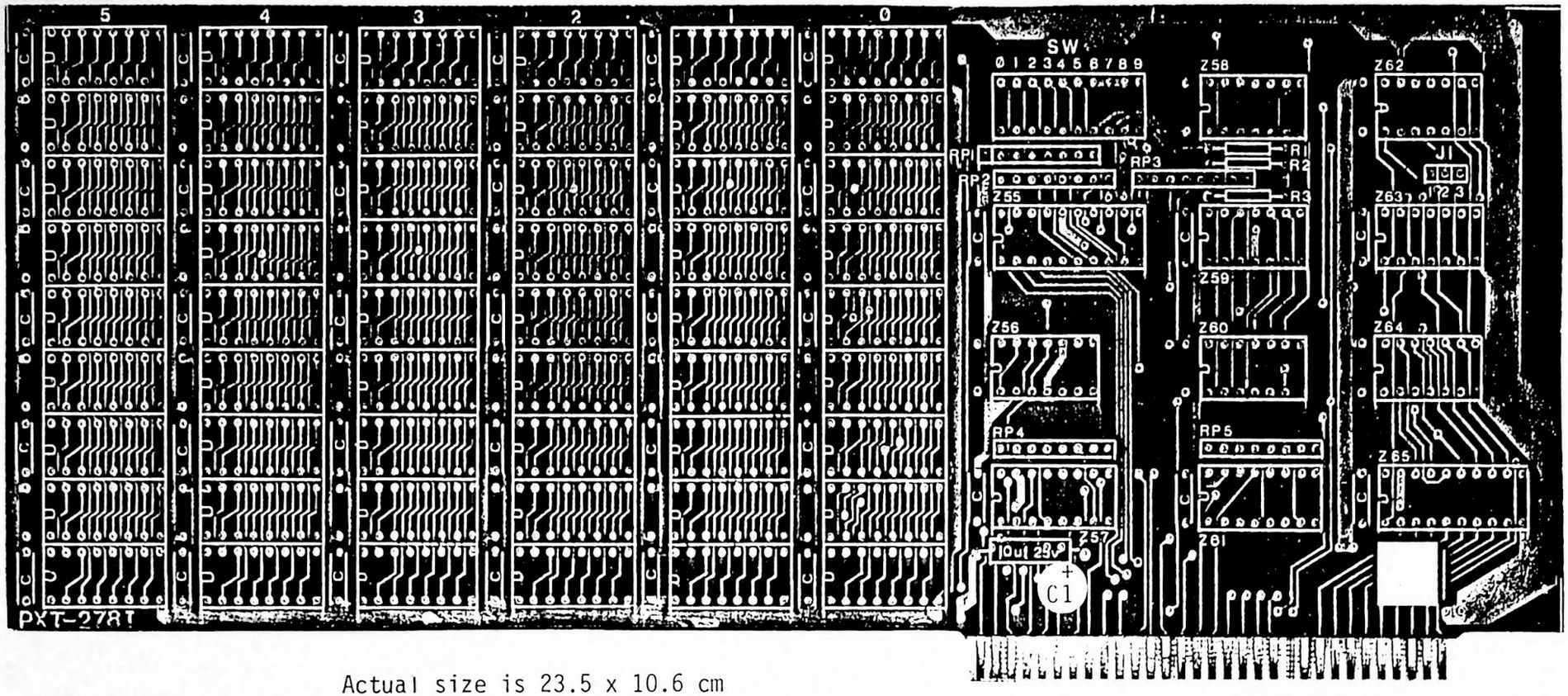
BANK	SWA SETTINGS
Ø	1
Ø,1	1,2,
Ø,1,2	1,2,3
Ø,1,2,3	1,2,3,4
etc.	etc.
Ø to 7	all 8 on

SWB: Selects starting address

STARTING ADDRESS (K)	SWB SETTINGS 1	2	3	4
0	1	1	1	1
64	0	1	1	1
128	1	0	1	1
192	0	0	1	1
256	1	1	0	1
320	0	1	0	1
384	1	0	1	1
448	0	0	0	1
512	1	1	1	0
576	0	1	1	0
640	1	0	1	0

NuScope Associates

PRELUDE 384 K EXPANSION CARD: Allows user to expand the memory of a fully-populated 256 K motherboard to 640 K in steps of 64 K. Requires firmware (one PROM). Documentation & schematics available from the supplier.



Actual size is 23.5 x 10.6 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

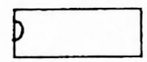
____ 3 - 4.7 KΩ @ R1,2,3
____ 1 - 330 Ω 9-pin SIP* bussed @ RP1
____ 4 - 22 Ω 8-pin SIP* isolated @ RP2,3,4,5

*Match pin 1 of SIPs with pin 1 (square, left side) on the layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

SOCKETS (continued)

____ 7 - 14-pin
____ 56 - 16-pin
____ 2 - 20-pin



CAPACITORS C

____ 36 - 0.1 µF Monolithic @ C
____ 1 - 33 µF/16V Axial* @ C1

*Match + of Axial with + on the layout

SWITCH

____ 1 - 10-position DIP

CONNECTORS

____ 1 - 1x3 header, male, straight @ J1 jumper pins 2 to 3
____ 1 - rear panel bracket

PRELUDE 384 K EXPANSION CARD (continued)

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

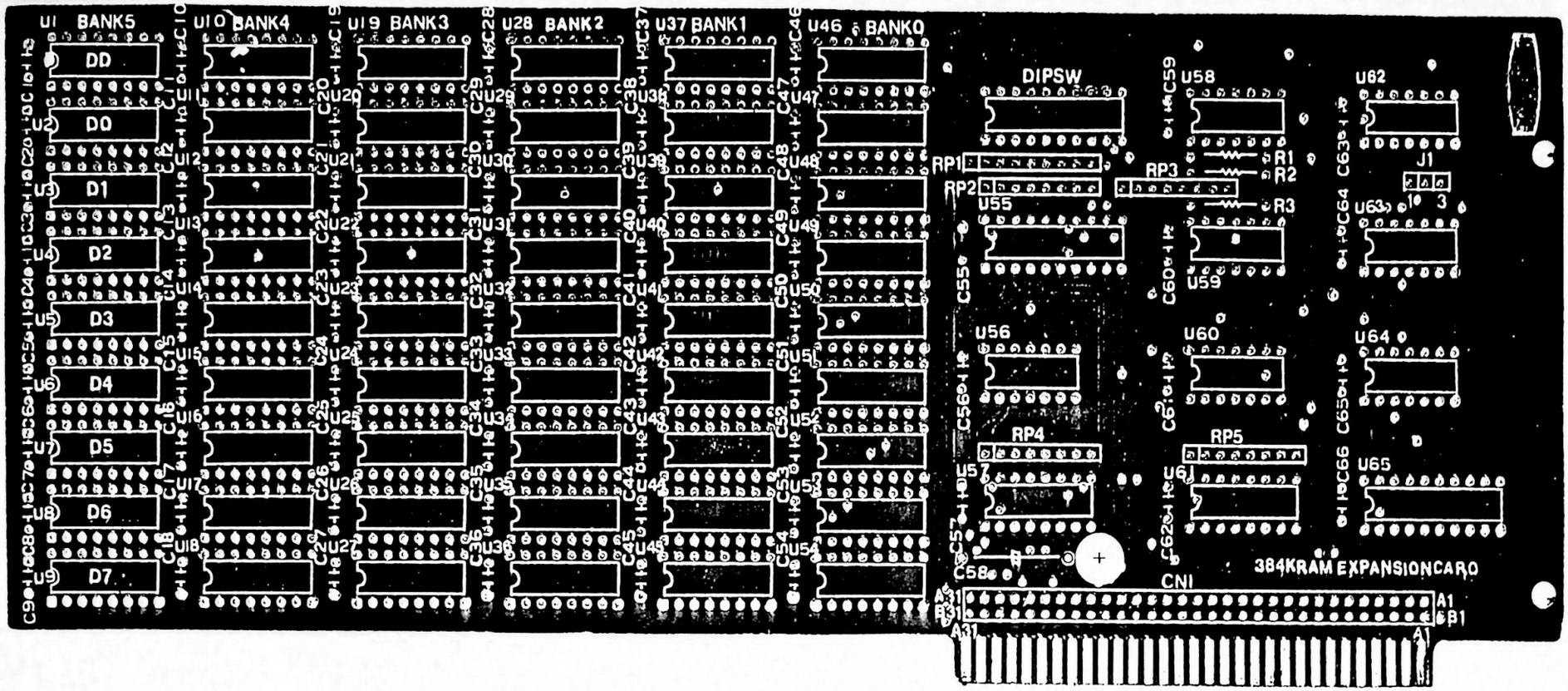
____ 1 - 74LS00 @ Z59
____ 1 - 74LS11 @ Z60
____ 1 - 74LS30 @ Z58
____ 2 - 74LS74 @ Z56,63
____ 1 - 74LS125 @ Z62
____ 1 - 74LS245 @ Z65

____ 2 - 74S157 @ Z57,61
____ 1 - 74S280 @ Z64

____ 1 - 28L22 (T.I.) 20-pin* PROM @ Z55

____54 - 4164 DRAM @ Z1 to 54

384 K RAM EXPANSION CARD: Expands the memory of a fully-populated motherboard in steps of 64 K to a maximum of 384 K of dynamic RAM. Requires firmware (one PROM). Documentaion and schematics are available from the supplier.



SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS ¼ watt, 5%

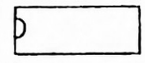
____ 3 - 4.7 KΩ @ R1,2,3
____ 1 - 330 Ω 9-pin SIP* bussed @ RP1
____ 4 - 22 Ω 8-pin SIP* isolated @ RP2,3,4,5

*Match pin 1 of SIP with pin 1 (square) on the layout

SOCKETS *Match pin 1 of sockets with pin 1 (square pad) on the layout. Check that ALL pins have passed thru ALL holes

SOCKETS (continued)

____ 7 - 14-pin
____ 56 - 16-pin
____ 2 - 20-pin



CAPACITORS C

____ 65 - 0.1 µF Monolithic @ C1 to 66 except @ C58*
____ 1 - 10 µF/50 V axial* @ C58 Match + of axial with + on the layout

SWITCH

____ 1 - 10-position DIP

CONNECTORS

____ 1 - 1x3 header, male, straight @ J1
____ 1 - rear panel bracket

384 K RAM EXAPANSION CARD (continued)

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U59
____ 1 - 74LS11 @ U60
____ 1 - 74LS30 @ U58
____ 2 - 74LS74 @ U56,63
____ 1 - 74LS125 @ U62
____ 1 - 74LS245 @ U65

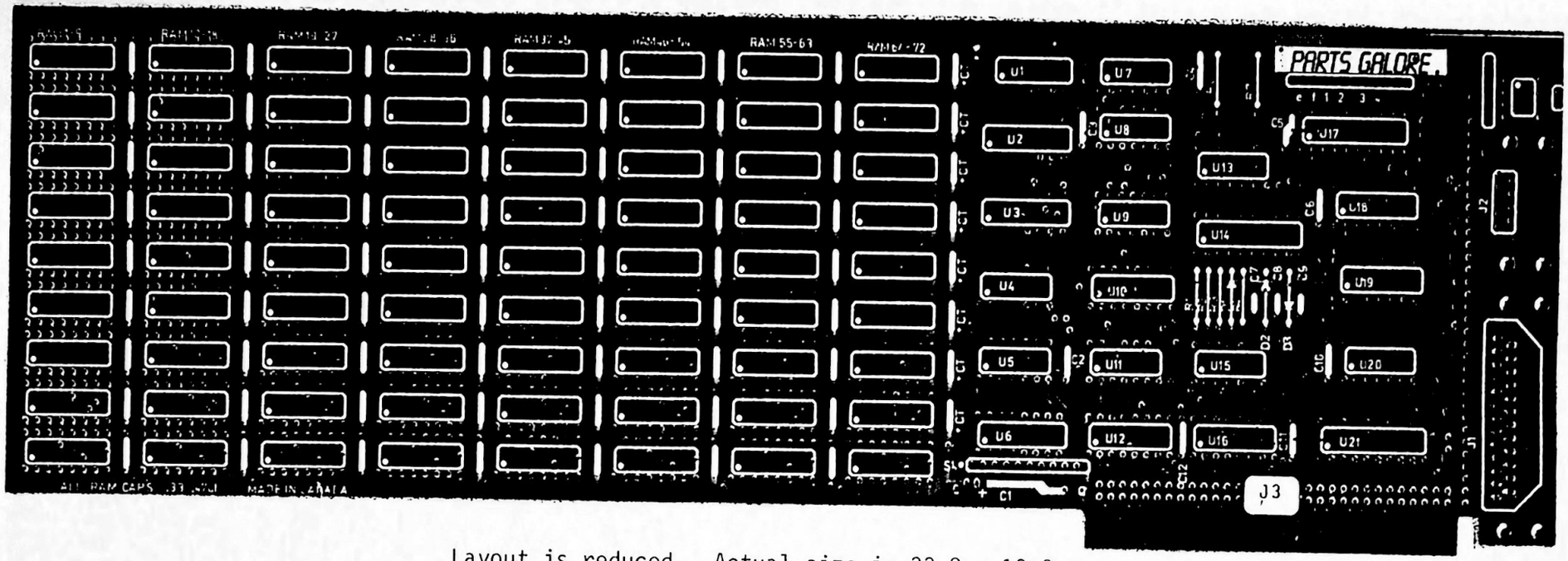
____ 2 - 74S157 @ U57,61
____ 1 - 74S280 @ U64

____ 1 - 28L22 (T.I.) PROM @ U55

____54 - 4164 DRAM @ U1 to 54

NuScope Associates

KRAM: Adds two MB of expansion memory to act as a high-speed RAM disk drive. Consists of main card plus a piggy-back terminator. More than one KRAM card may be installed in a system. Requires software (one diskette). Documentation available from supplier.



Layout is reduced. Actual size is 33.8 x 10.9 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

DIODES *Position banded end (cathode) towards the arrow

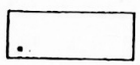
____ 3 - iN914 @ D1,2,3

RESISTORS R ¼ watt, 5% *R5 not equipped

____ 2 - 33 Ω @ R2,3
____ 1 - 120 Ω @ R6
____ 2 - 470 Ω @ R4,7
____ 1 - 2 KΩ @ R1
____ 1 - 2 KΩ 10-pin SIP*, bussed @ S1
*Match pin 1 of SIP with pin 1 (white dot) on the layout
____ 1 - 33 Ω 16-pin DIP resistor network @ U6

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 10 - 14-pin
____ 80 - 16-pin
____ 2 - 20-pin



CAPACITORS C

____ 1 - 82 pF silver mica @ C9
____ 2 - 331 pF silver mica @ C7,8
____ 65 - 0.47 µF Monolithic @ C11,12
____ 6 - 0.1 µF Monolithic @ C2,3,4,5, & @ C6.10

CAPACITORS (continued)
*Match + of the following with + on the layout

____ 1 - 10 µF/16V Axial* @ C1
____ 1 - 10 µF/16V Tantalum* @ CT

CONNECTORS

____ 3 - 1x3 header, male, straight @ e,f,1,2,3,4 to select number of KRAM cards
____ 1 - 2x31 header, male, straight @ J3 for terminator

KRAM (continued)

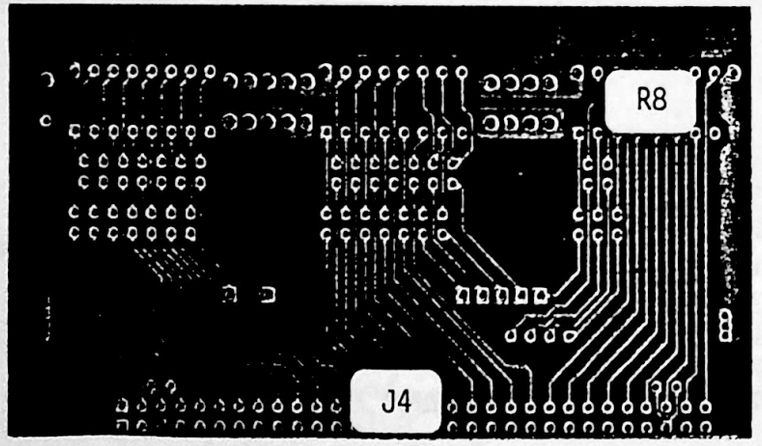
CONNECTORS (continued)

____ 1 - DB25P (optional) @ J1
____ 1 - DE9P (optional) @ J2
____ - - shorting plugs

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout. *U17 is not equipped

____ 1 - 74LS04 @ U7
____ 3 - 74LS08 @ U4,5,9
____ 1 - 74LS20 @ U15
____ 2 - 74LS32 @ U1,13
____ 1 - 74LS74 @ U8
____ 1 - 74LS125 @ U11
____ 2 - 74LS138 @ U2,3
____ 3 - 74LS158 @ U12,16,19
____ 2 - 74LS189 @ U10,18
____ 1 - 74LS240 @ U14
____ 1 - 74LS245 @ U21
____ 1 - 74LS280 @ U20

PIGGY-BACK TERMINATOR CARD: May be required to alleviate timing problems on some systems



COMPONENT SIDE
Actual size is 9.7 x 5.4 cm

PIGGY-BACK TERMINATOR (continued)

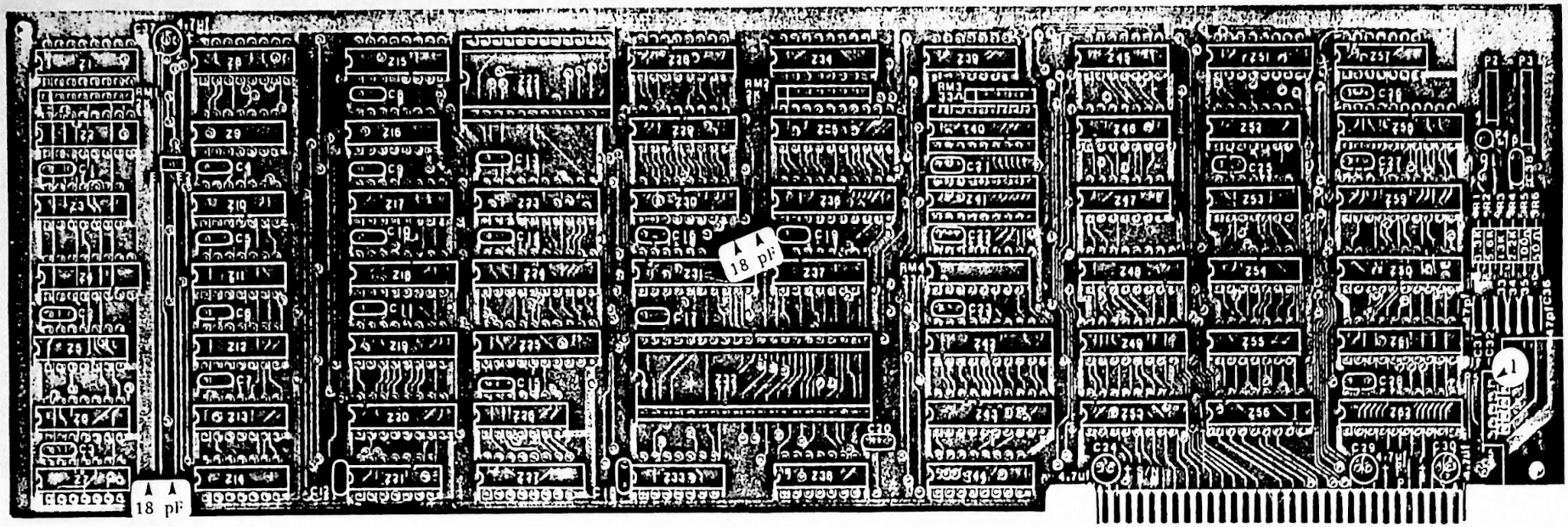
INSTALL on component side

____ 1 - 4.7 KΩ 16-pin DIP resistor network @ R8

INSTALL on solder side

____ 2x31 header, female @ J4 to mate with J3 main card

COLOUR GRAPHICS DISPLAY CARD: Allows user to interface the following with the computer: monochrome or colour composite monitor, RF modulator, lightpen. Card contains 16 K of dynamic RAM for storage information & operates in medium or high-resolution graphics mode, or low or high-resolution alphanumeric mode (40 or 80 characters by 25 rows). Requires firmware (one EPROM). With power off, install in any vacant slot. *CAUTION: Damage may result if more than one colour adapter is installed in the system.



Layout is reduced. Actual size is 33.5 X 10.4 cm

SUGGESTED SEQUENCE *INDICATES A PRECUATION

RESISTORS R ¼ watt, 5%

____ 1 - 50 Ω @ R6
____ 1 - 100 Ω @ R5
____ 1 - 2.2 KΩ @ R4
____ 1 - 3.3 KΩ @ R1
____ 1 - 5.6 KΩ @ R2
____ 1 - 13 KΩ @ R3

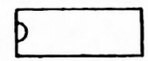
*Match pin 1 of SIP & DIP resistors with pin 1 (square pad) on the layout

____ 2 - 2 KΩ SIP, 8-pin @ RM1,2
____ 1 - 33 Ω SIP, isolated, 6-pin @ RM3 or three 33 Ω on end
____ 1 - 33 Ω DIP, 16-pin @ RM4

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____26 - 14-pin
____16 - 16-pin
____ 2 - 18-pin
____13 - 20-pin
____ 1 - 24-pin
____ 1 - 40-pin

*Z1,2,4 are not equipped



pin 1 lower left for ALL sockets

CAPACITORS C

____ 2 - 18 pF @ positions shown on layout
____ 6 - 47 pF @ C31,32,33,34,35,36
____28 - 0.1 µF Monolithic @ C1-23,25,26,27 C28,38

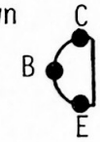
CAPACITORS (continued)

____ 4 - 4.7 µF/35V Radial @ C24,29, C30,37

*Match + of radials with + on the layout

TRANSISTOR Q *Match the EBC transistor leads as shown

____ 1 - 2N3904



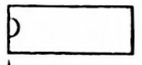
COLOUR GRAPHICS DISPLAY CARD (continued)

CONNECTORS *All headers are male, straight

____ 1 - 1x2 header @ E1,E2 (Character Set Selection)
____ 1 - 1x4 header @ P2 (RF Modulator Strip) remove pin 2
____ 1 - 1x6 header @ P3 (Lightpen Strip) remove pin 2
____ 1 - 1-pin @ P4 (Composite Video) connect to hot of phono jack,
____ 1 - DE9S 9-position female receptacle, PCB mount @ P5 (Direct Drive - RGB)
____ 1 - phono jack (Composite Video) connect ground of jack to ground on card
____ 1 - jumper plug: with plug on E1,E2 vertical lines of characters are two dots wide; without plug, lines are one dot wide
____ 1 - rear panel adapter

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 (square pad) on the layout. Leave Z1,2,4 blank

____ 2 - 74LS00 @ Z33,47
____ 1 - 74LS02 @ Z12
____ 1 - 74LS08 @ Z45
____ 2 - 74LS10 @ Z14,55
____ 1 - 74LS51 @ Z3
____ 3 - 74LS74 @ Z5,38,52
____ 1 - 74LS86 @ Z26
____ 1 - 74LS125 @ Z54
____ 3 - 74LS138 @ Z44,48,56
____ 1 - 74LS163 @ Z8
____ 1 - 74LS164 @ Z6
____ 3 - 74LS166 @ Z28,29,30
____ 2 - 74LS174 @ Z19,20
____ 1 - 74LS175 @ Z51
____ 3 - 74LS244 @ Z59,60,61
____ 1 - 74LS245 @ Z62
____ 5 - 74LS273 @ Z23,24,31,35,36
____ 3 - 74LS374 @ Z42,43,58
____ 1 - 74LS393 @ Z37



pin 1 lower left for ALL sockets

____ 1 - 74S00 @ Z13
____ 1 - 74S02 @ Z11
____ 3 - 74S04 @ Z9,10,53
____ 1 - 74S32 @ Z46
____ 1 - 74S51 @ Z16
____ 4 - 74S74 @ Z7,21,39,57
____ 1 - 74S151 @ Z27
____ 2 - 74S153 @ Z17,18
____ 1 - 74S157 @ Z15
____ 1 - 74S175 @ Z34
____ 2 - 74S257 @ Z49,50
____ 1 - 74S374 @ Z25

____ 1 - 2732A EPROM @ Z22 Character generator
____ 1 - 6845SP (Hitachi) @ Z32 CRT cont.
____ 2 - TMS4416-15 (T.I.) @ Z40,41 Display memory

CONNECTOR PINOUTS

P2 : RF MODULATOR - with television set

colour card		modulator
1	+12V	1
2	not used	2
3	video output	3
4	logic ground	4

P3 : LIGHTPEN PINOUT - with lightpen

colour card		lightpen
1	pen input	1
2	not used	2
3	pen switch	3
4	logic ground	4
5	+5V	5
6	+12V	6

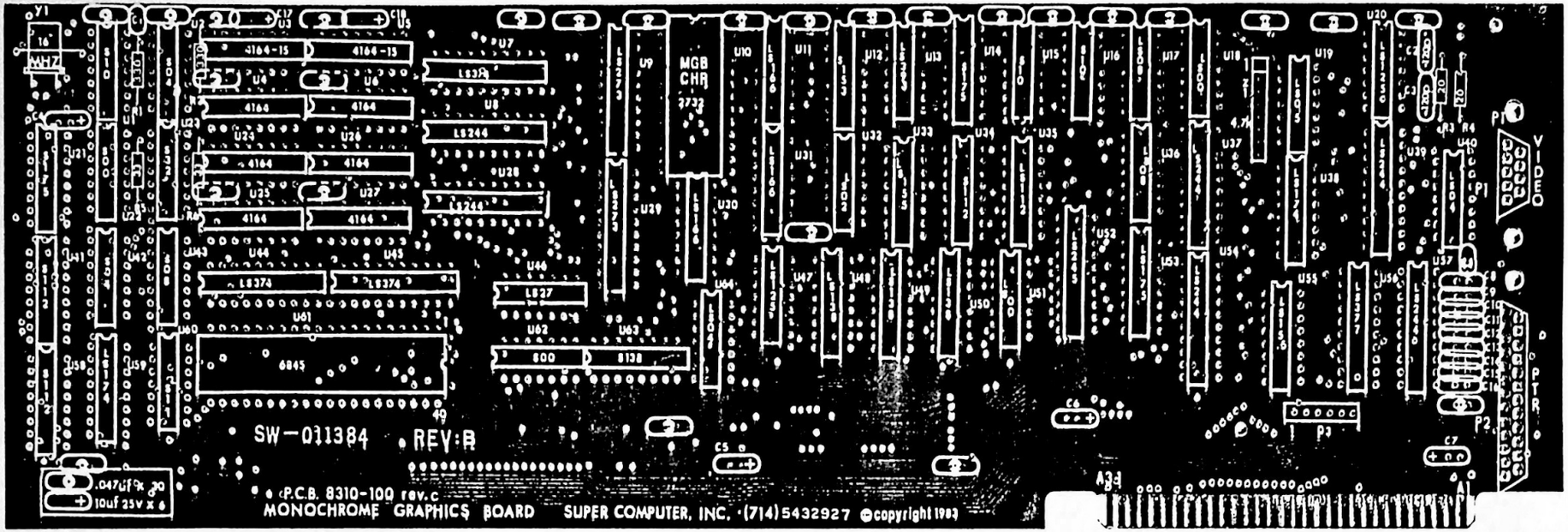
P4 : PHONO JACK - with composite video monitor

colour card		video monitor
1	peak-to-peak AMP	1
2	chassis ground	2

P5 : DIRECT DRIVE - with direct drive monitor (RGB)

colour card		monitor
1	ground	1
2	ground	2
3	red	3
4	green	4
5	blue	5
6	intensity	6
7	reserved	7
8	horizontal drive	8
9	vertical drive	9

FOUNTAIN MONOCHROME GRAPHICS CARD: Offers: a) video - text mode (80 x 25 lines); graphics mode (720 columns x 348 addressable dots), b)parallel printer port, & c) 64 K bytes of display buffer. Do NOT use this card together with another monochrome card or colour card. Do NOT run the diagnostics program without making appropriate changes. With power off, install in any available slot. Documentaion & schematics available from supplier. Requires EPROM.



SUGGESTED SEQUENCE *INDICATES A PRECAUTION

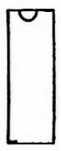
Layout is reduced. Actual size is 33.3 x 11.7 cm.

RESISTORS R ¼ watt, 5%

____ 2 - 20 Ω @ R3,4
____ 2 - 33 Ω @ R5,6
____ 2 - 330 Ω @ R1,2
____ 1 - 4.7 KΩ 8-pin SIP* @ Z1
*Match pin 1 of SIP with pin 1 on the layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____22 - 14-pin
____27 - 16-pin
____13 - 20-pin
____ 1 - 24-pin
____ 1 - 40-pin

pin 1 ➤ 

CAPACITORS C

____ 2 - 120 pF @ C2,3
____10 - 0.01 µF @ C1,8,9,10,11,12,13,14, C15,16
____30 - 0.1 µF Monolithic @ ⊙
____ 6 - 10 µF/25V Tantalum* @ C4,5,6,7,17,18
*Match + of Tantalums with + on the layout

CRYSTAL Y *Fold crystal flat against the card before soldering. Solder the case to the two grounding pads at sides of crystal

____ 1 - 16.0000 MHz @ Y1

CONNECTORS

____ 1 - DE9S female, 90° @ P1, Video
____ 1 - DB25S female, 90° @ P2, printer port
____ 1 - 1x6 header, male, straight @ P3 lightpen
____ 1 - rear panel adapter + hardware

FOUNTAIN MONOCHROME GRAPHICS CARD (continued)

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 2 - 74LS00 @ U18,51
____ 1 - 74LS02 @ U32
____ 2 - 74LS04 @ U40,64
____ 1 - 74LS05 @ U19
____ 2 - 74LS08 @ U17,36
____ 1 - 74LS11 @ U60
____ 1 - 74LS27 @ U46
____ 1 - 74LS112 @ U35
____ 2 - 74LS125 @ U20,47
____ 3 - 74LS138 @ U48,49,50
____ 2 - 74LS155 @ U33,55
____ 3 - 74LS166 @ U11,30,31
____ 2 - 74LS174 @ U38,59
____ 1 - 74LS175 @ U53
____ 6 - 74LS244 @ U8,28,37,39,54,57
____ 1 - 74LS245 @ U52
____ 2 - 74LS273 @ U9,29
____ 4 - 74LS374 @ U7,44,45,56
____ 1 - 74LS393 @ U13

____ 2 - 74S00 @ U22,62
____ 2 - 74S04 @ U2,42
____ 1 - 74S08 @ U43
____ 3 - 74S10 @ U1,15,16
____ 1 - 74S32 @ U23
____ 3 - 74S112 @ U34,41,58
____ 1 - 74S138 @ U63
____ 1 - 74S153 @ U12
____ 2 - 74S175 @ U14,21

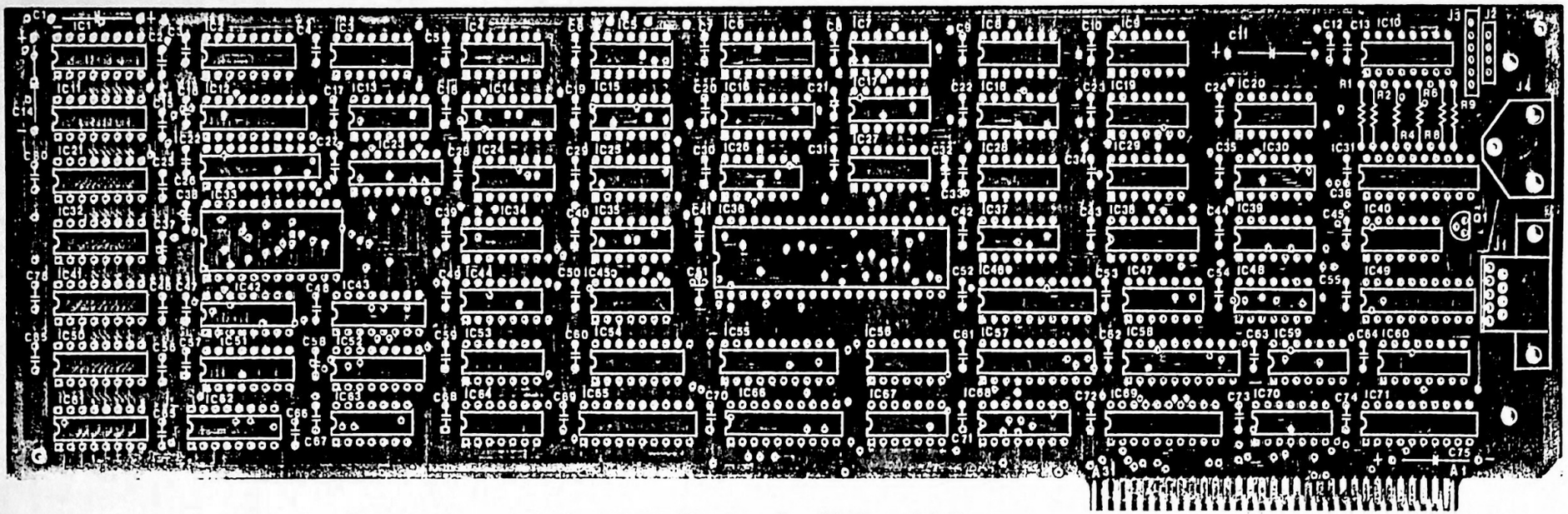
____ 1 - 6845 CRT Controller @ U61
____ 8 - 4164 RAM, 150 ns @ U3,4,5,6, U24,25,26,27
____ 1 - 2732 EPROM, Character generator @ U10

LIGHTPEN PINOUT

card	lightpen
1 pen input	1
2 not used	2
3 pen switch	3
4 ground	4
5 +5V	5
6 +12V	6

NuScope Associates

COLOR/GRAPHICS ADAPTER CARD: Four-layered PCB with a) colour video & b) 16 k bytes of display buffer. Video mode: alphanumeric mode (40 columns x 25 rows or 80 columns x 25 rows); graphics mode (200 rows x 320 dots or 200 rows x 640 dots. Other video features include: interface with composite video port, direct drive (RGB) port, RF modulator & light pen. With power off, install in any available slot. Documentation & schematics available from supplier. Requires firmware (one EPROM).



Layout is reduced. Actual size is 33.8 x 11.5 cm.

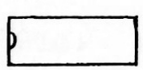
SUGGESTED SEQUENCE *INDICATES A PRECAUTION *MODIFICATION REQUIRED

RESISTORS R ¼ watt, 5%

____ 1 - 51 Ω @ R9
____ 1 - 100 Ω @ R1
____ 1 - 2.2 KΩ @ R4
____ 1 - 3.3 KΩ @ R2
____ 1 - 5.6 KΩ @ R8
____ 1 - 13 KΩ @ R6
____

SOCKETS * Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____39 - 14-pin
____18 - 16-pin
____12 - 20-pin
____ 1 - 24-pin
____ 1 - 40-pin



CAPACITORS C

____ 4 - 2.2 µF/16V Axial* @ C1,11,14,75
*Match + of Axial with + on the layout
____50 - 0.1 F Monolithic @ all other positions labelled C

TRANSISTOR Q *Install the three EBC leads as shown

____ 1 - 2N3904 @ Q1

CONNECTORS

____ 1 - DE9S 9-pin female, 90°, PCB mount, @ J1 (RGB)
____ 1 - 1x4 header, male, straight, @ J2 (RF modulator)
____ 1 - 1x6 header, male, straight, @ J3 (light pen)
____ 1 - RCA phono jack @ J4 (composite video)
____ 1 - rear panel adapter

COLOR/GRAPHICS ADAPTER CARD: (continued)

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 2 - 74LS00 @ IC27,29
____ 2 - 74LS02 @ IC5,67
____ 4 - 74LS04 @ IC26,28,30,34
____ 3 - 74LS08 @ IC24,40,47
____ 1 - 74LS10 @ IC25
____ 1 - 74LS14 @ IC8
____ 2 - 74LS30 @ IC59,70
____ 4 - 74LS32 @ IC37,44,48,56
____ 2 - 74LS51 @ IC45,53
____ 4 - 74LS74 @ IC3,9,19,20
____ 3 - 74LS86 @ IC17,18,35
____ 1 - 74LS125 @ IC39
____ 1 - 74LS138 @ IC38
____ 1 - 74LS151 @ IC14
____ 2 - 74LS153 @ IC51,52
____ 1 - 74LS158 @ IC6
____ 1 - 74LS164 @ IC15
____ 3 - 74LS166 @ IC2,23,42
____ 3 - 74LS174 @ IC16,54,68
____ 1 - 74LS175 @ IC10
____ 4 - 74LS244 @ IC31,49,55,65
____ 1 - 74LS245 @ IC71
____ 2 - 74LS273 @ IC12,22
____ 5 - 74LS374 @ IC46,57,58,66,69
____ 1 - 74LS393 @ IC64

____ 2 - 74S74 @ IC4,13
____ 1 - 74S164 @ IC7
____ 1 - 74S174 @ IC43
____ 1 - 74S175 @ IC60

____ 1 - 2716 2Kx8 EPROM @ IC33
____ 8 - 4116 200 ns RAM @ IC1,11,21,32 IC41,50,61,62
____ 1 - 6845SP (Hitachi) @ IC36

CONNECTOR SPECIFICATIONS (pinout)

J1: DIRECT-DRIVE (RGB) MONITOR

color card		monitor
1	ground	1
2	ground	2
3	red	3
4	green	4
5	blue	5
6	intensity	6
7	reserved	7
8	horizontal drive	8
9	vertical drive	9

J2: RF MODULATOR

color card		modulator
1	+12V	1
2	not used	2
3	video output	3
4	logic ground	4

J3: LIGHT PEN

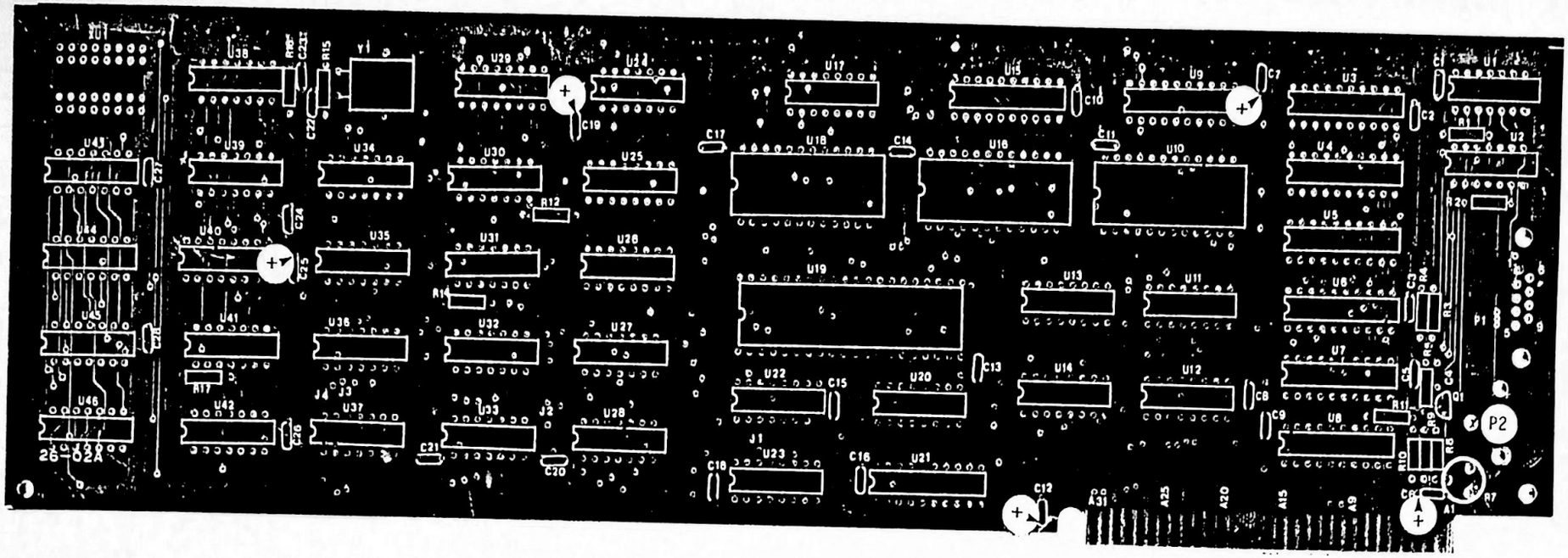
color card		lightpen
1	pen input	1
2	not used	2
3	pen switch	3
4	logic ground	4
5	+5V	5
6	+12V	6

J4: RCA JACK

color card		video monitor
1	video	1
2	ground	2

NuScope Associates

PG-2 MONOCHROME/GRAPHICS: Features a) both composite and monochrome video output - i) text mode, 80 x 25 lines, ii) graphics mode, 720 columns x 348 dots; b)4 K bytes of display buffer. Requires firmware (one EPROM).



Layout is reduced. Actual size is 33.5 x 11.8 cm.

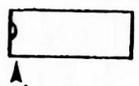
SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5% *R6, 13 are not shown

____ 2 - 22 Ω @ R3,4,8
____ 1 - 150 Ω @ R9
____ 3 - 2 KΩ @ R2,5,11
____ 4 - 4.7 KΩ @ R1,12,14,17
____ 1 - 200 Ω Trimpot @ R7
____ 1 - 1.5 KΩ @ R10
____ 2 - 470 Ω @ R15,16

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____21 - 14-pin
____12 - 16-pin
____ 9 - 20-pin
____ 3 - 24-pin
____ 1 - 40-pin



CAPACITORS C *C24 - not equipped

____ 1 - 56 pF @ C22
____ 2 - 100 pF @ C4,5
____ 1 - 0.001 µF @ C23
____18 - 0.1 µF Monolithic @ C1,2,3,8, C9,10,11,13,14,15,16,17, C18,20,21,26,27,28
____ 5 - 10 µF/16V Tantalum* @ C6,7, C12,19,25
*Match + of Tantalums with + on the layout

TRANSISTOR Q Position the EBC transistor leads as shown on the layout

____ 1 - 2N3904 @ Q1

CRYSTAL Y *Fold crystal flat against the card before soldering. Solder the case to the grounding pads

____ 1 - 16.0000 MHz @ Y1

CONNECTORS

____ 1 - DE9S female, 90°, PCB mount @ P1 for video
____ 1 - RCA phono jack @ P2 for composite video
____ 4 - jumper pins @ J1,2,3,4
Strap J1 to J3
J2 to J4
____ 1 - rear panel adapter

PG-2 MONOCHROME/GRAPHICS CARD (continued):

INTEGRATED CIRCUITS *Match pin 1 of ICs
with pin 1 on the layout

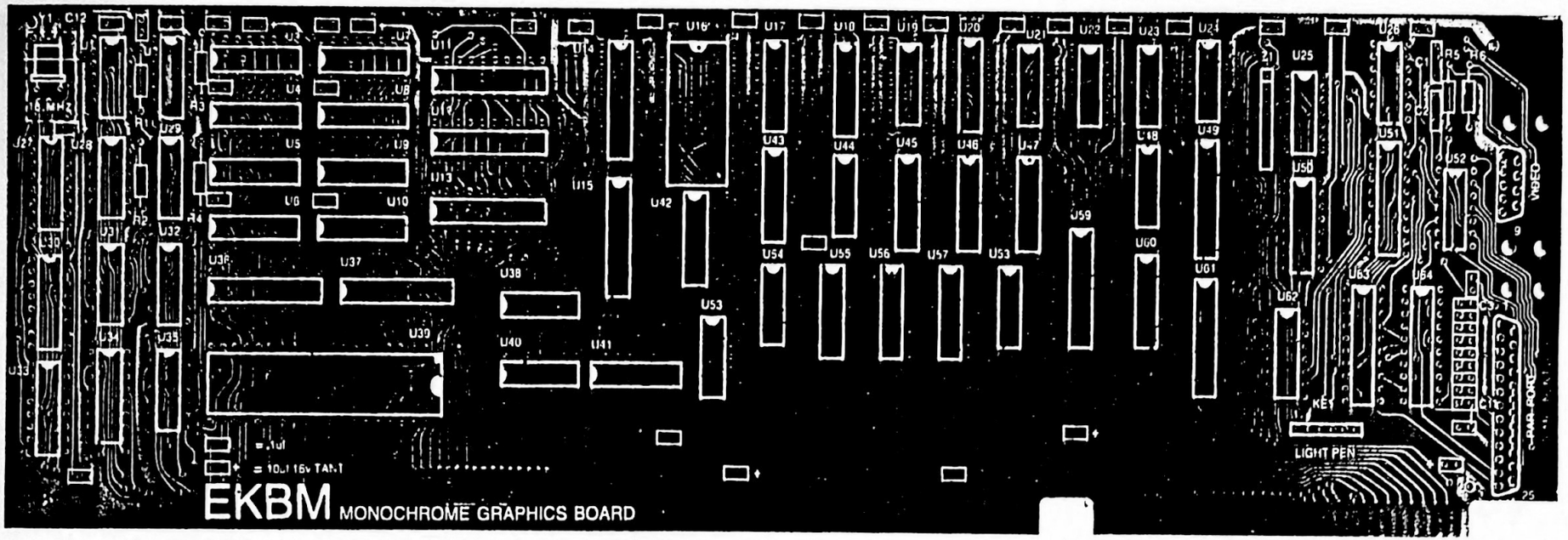
____ 2 - 74LS00 @ U28,36
____ 2 - 74LS02 @ U24,35
____ 3 - 74LS04 @ U1,27
____ 1 - 74LS08 @ U44
____ 1 - 7408 @ U37
____ 1 - 74LS11 @ U39
____ 1 - 74LS32 @ U33
____ 5 - 74LS74 @ U31,32,41,46
____ 1 - 74LS86 @ U30
____ 2 - 74LS125 @ U2,42
____ 3 - 74LS138 @ U12,20,22
____ 2 - 74LS139 @ U17,23
____ 3 - 74LS157 @ U11,13,14
____ 1 - 74LS166 @ U25
____ 3 - 74LS174 @ U26,29,40
____ 4 - 74LS244 @ U3,6,7,21
____ 1 - 74LS245 @ U8
____ 1 - 74LS273 @ U9
____ 3 - 74LS374 @ U4,5,15
____ 1 - 74LS393 @ U45

____ 2 - TMM2016 @ U10,16 static RAM
____ 1 - 6845SP @ U19
____ 1 - 2732 EPROM @ U18

____ 1 - 7410 @ U43
____ 1 - 74S04 @ U38
____ 1 - 74S32 @ U34

NuScope Associates

EKBM MONOCHROME GRAPHICS CARD: Features: Video text mode, 80 x 25 lines; graphics mode, 720 columns x 348 addressable dots; 64 K bytes of display memory; lightpen output; parallel printer port. Do NOT use this card together with another monochrome card or colour card. Do NOT run the diagnostics program without making the necessary changes. Requires firmware (one EPROM).



SUGGESTED SEQUENCE *INDICATES A PRECAUTION

Layout is reduced. Actual size is 33.4 x 11.7 cm

RESISTORS R ¼ watt, 5%

____ 2 - 20 Ω @ R5,6
____ 2 - 30 Ω @ R2,4
____ 2 - 330 Ω @ R1,3
____ 1 - 4.7 KΩ 8-pin SIP* @ Z1
*Match pin 1 of SIP with pin 1 (square) on the layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____22 - 14-pin
____27 - 16-pin
____13 - 20-pin
____ 1 - 24-pin
____ 1 - 40-pin

pin 1 ➤

CAPACITORS C

____ 2 - 120 pF @ C1,2
____10 - 0.02 µF @ C3,4,5,6,7,8,9,10 11,12
____30 - 0.1 µF Monolithic @ ▭
____10 - 10 µF/16V Tantalum* @ ▭ +
*Match + of Tantalums with + on the layout

CRYSTAL Y *Fold crystal flat against the card before soldering. Solder the case to the two grounding pads.

____ 1 - 16.0000 MHz @ Y1

CONNECTORS

____ 1 - DE9S female, 90° @ VIDEO
____ 1 - DB25S female, 90° @ PAR. PORT
____ 1 - 1x6 header, male, straight @ LIGHT PEN
____ 1 - rear panel adapter + hardware

EKBM MONOCHROME GRAPHICS CARD (continued)

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 2 - 74LS00 @ U24,58
____ 1 - 74LS02 @ U44
____ 2 - 74LS04 @ U52,53
____ 1 - 74LS05 @ U25
____ 2 - 74LS08 @ U23,48
____ 1 - 74LS11 @ U35
____ 1 - 74LS27 @ U38
____ 1 - 74LS112 @ U47
____ 2 - 74LS125 @ U26,54
____ 3 - 74LS138 @ U55,56,57
____ 2 - 74LS155 @ U45,62
____ 3 - 74LS166 @ U17,42,43
____ 2 - 74LS174 @ U34,50
____ 1 - 74LS175 @ U60
____ 6 - 74LS244 @ U12,13,49,51,61,64
____ 1 - 74LS245 @ U59
____ 2 - 74LS273 @ U14,15
____ 3 - 74LS374 @ U11,36,37
____ 1 - 74LS377 @ U63
____ 1 - 74LS393 @ U19

____ 2 - 74S00 @ U28,40
____ 2 - 74S04 @ U2,31
____ 1 - 74S08 @ U32
____ 3 - 74S10 @ U1,21,22
____ 1 - 74S32 @ U29
____ 3 - 74S112 @ U30,33,46
____ 1 - 74S138 @ U41
____ 1 - 74S153 @ U18
____ 2 -74S175 @ U20,27

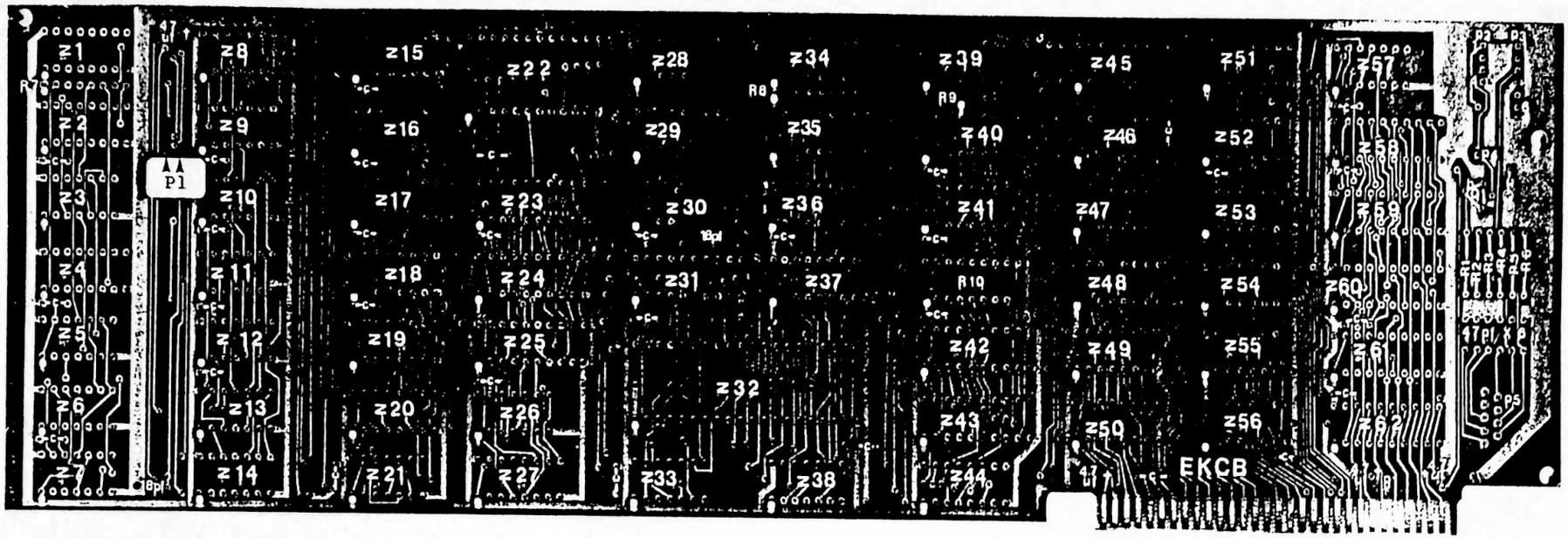
____ 1 - 6845 CRT Controller @ U39
____ 8 - 4164 RAM, 150 ns
@ U3,4,5,6,7,8,9,10
____ 1 - 2732 EPROM, Character Generator
@ U16

LIGHTPEN PINOUT

CARD		LIGHTPEN
1	pen unput	1
2	key	2
3	pen switch	3
4	logic ground	4
5	+5V	5
6	+12V	6

4-5 pg 2

EKCB COLOUR GRAPHICS VIDEO CARD: Allows user to interface: monochrome or colour composite monitor; RF modulator; lightpen. Card contains 16 K of dynamic RAM for storage of information and operates in medium to hi-resolution graphics mode, or low or hi-resolution alphanumeric mode (40 or 80 characters by 25 rows). Requires firmware (one EPROM). Caution: do NOT use more than one colour card in the system.



Layout is reduced. Actual size is 33.5 x 10.4 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

____ 1 - 47 Ω @ R6
____ 1 - 100 Ω @ R5
____ 1 - 2.2 KΩ @ R4
____ 1 - 3.3 KΩ @ R1
____ 1 - 5.6 KΩ @ R2
____ 1 - 13 KΩ @ R3

*Match pin 1 of the following with pin 1 (white dot) on the layout.

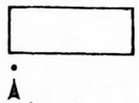
____ 2 - 2.2 KΩ SIP, 8-pin bussed @ R7,8
____ 1 - 33 Ω SIP, 6-pin isolated @ R9
____ 1 - 33 Ω DIP, 16-pin isolated @ R10

Single 33 Ω resistors may be substituted for the isolated resistor packs

SOCKETS *Match pin 1 of sockets with pin 1 (white dot) on the layout. Check that ALL pins have passed thru ALL holes

*Z1,2,4 & R10 are not equipped with sockets

____26 - 14-pin
____16 - 16-pin
____ 2 - 18-pin
____13 - 20-pin
____ 1 - 24-pin
____ 1 - 40-pin



CAPACITORS C

____ 2 - 18 pF @ 18 pF
____ 6 - 47 pF @ 47 pF x 6
____32 - 0.1 µF Monolithic @ ••c••

CAPACITORS (continued)

____ 4 - 4.7 µF/25V Radial* @4.7 µF
*Match + of Radials with + on the layout

TRANSISTOR Q *Position EBC transistor leads as shown on the layout

____ 1 - 2N3904 @ Q1

EKCB COLOUR GRAPHICS VIDEO CARD (continued)

CONNECTORS All headers are male, straight

____ 1 - 1x2 header @ P1 (character set selection)
____ 1 - 1x4 header @ P2 (RF Modulator strip) remove pin 2
____ 1 - 1x6 header @ P3 (lightpen strip) remove pin 2
____ 1 - 1-pin @ P4 (composite video) connect to hot of phono jack
____ 1 - DE9S 9-position female @ P5 (RGB)
____ 1 - phono jack (composite video) connect ground of jack to ground on card
____ 1 - jumper plug - with plug on P1 vertical lines of characters are two dots wide; without plug, lines are one dot wide
____ 1 - rear panel adapter

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 (white dot) on the layout

____ 2 - 74LS00 @ Z33,47
____ 1 - 74LS02 @ Z12
____ 1 - 74LS08 @ Z45
____ 2 - 74LS10 @ Z14,55
____ 1 - 74LS51 @ Z3
____ 3 - 74LS74 @ Z5,38,52
____ 1 - 74LS86 @ Z26
____ 1 - 74LS125 @ Z54
____ 3 - 74LS138 @ Z44,48,56
____ 1 - 74LS163 @ Z8
____ 1 - 74LS164 @ Z6
____ 3 - 74LS166 @ Z28,29,30
____ 2 - 74LS174 @ Z19,20
____ 1 - 74LS175 @ Z51
____ 3 - 74LS244 @ Z59,60,61
____ 1 - 74LS245 @ Z62
____ 5 - 74LS273 @ Z23,24,31,35,36
____ 3 - 74LS374 @ Z42,43,58
____ 1 - 74LS393 @ Z37

____ 1 - 74S00 @ Z13
____ 1 - 74S02 @ Z11
____ 3 - 74S04 @ Z9,10,53
____ 1 - 74S32 @ Z46
____ 1 - 74S51 @ Z16
____ 4 - 74S74 @ Z7,21,39,57
____ 1 - 74S151 @ Z27
____ 2 - 74S153 @ Z17,18
____ 1 - 74S157 @ Z15
____ 1 - 74S175 @ Z34
____ 2 - 74S257 @ Z49,50
____ 1 - 74S374 @ Z25

____ 1 - 2732A EPROM @ Z22 Char Gen
____ 1 - 6845SP (Hitachi) @ Z32 CRT cont
____ 2 - TMS4416-15 ns (T.I.) @ Z40,41 Display Memory

CONNECTOR PINOUTS

P2 : RF MODULATOR - with television set

colour card		modulator
1	+12V	1
2	not used	2
3	video output	3
4	logic ground	4

P3 : LIGHTPEN PINOUT - with lightpen

colour card		lightpen
1	pen input	1
2	not used	2
3	pen switch	3
4	logic ground	4
5	+5V	5
6	+12V	6

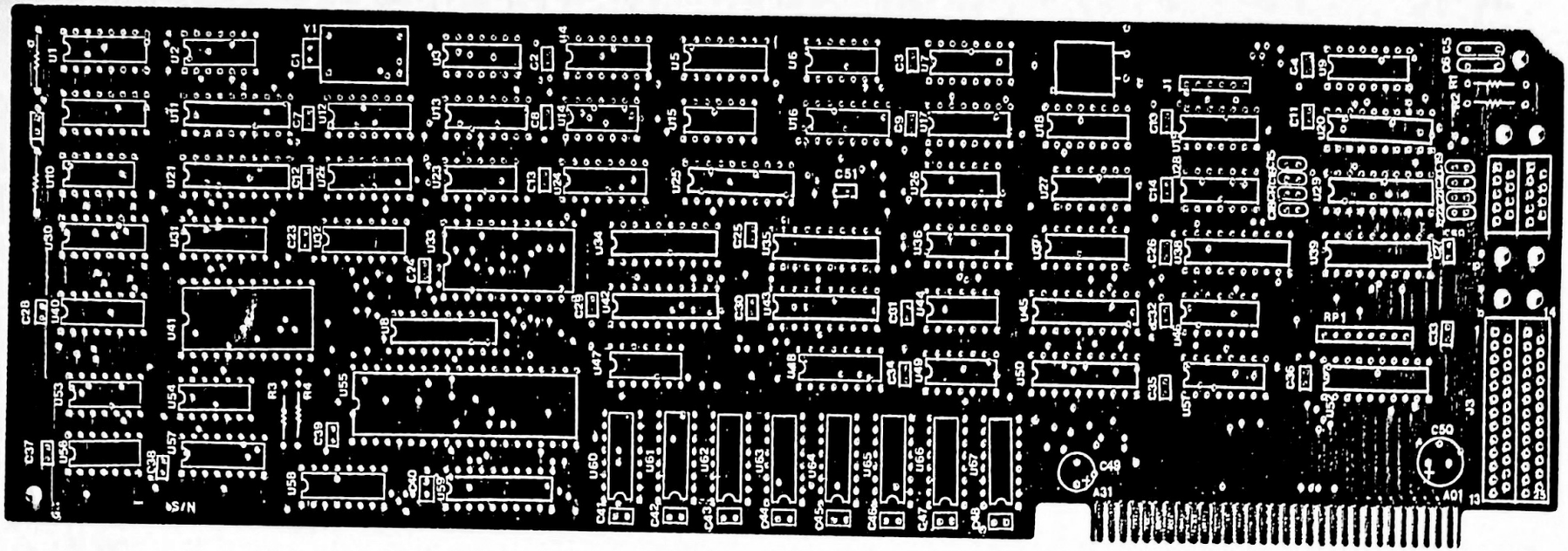
P4 : PHONO JACK - with composite video monitor

colour card		video monitor
1	peak-to-peak AMP	1
2	chassis ground	2

P5 : DIRECT DRIVE - with direct drive monitor (RGB)

colour card		monitor
1	ground	1
2	ground	2
3	red	3
4	green	4
5	blue	5
6	intensity	6
7	reserved	7
8	horizontal drive	8
9	vertical drive	9

MONOCHROME-GRAPHICS/PRINTER CARD VERSION II: Features: a) video - text mode (80 x 25 lines); graphics mode (720 columns x 348 addressable dots), b) parallel printer port, c) 64 K bytes of screen buffer, d) light pen output. Do not run the diagnostics program under version 2.0 without making the appropriate modifications. Do not use with another monochrome card. Requires firmware (one EPROM) and software (one diskette). Documentaion available from the suppier.



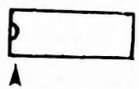
SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

____ 2 - 22 Ω @ R1,2
____ 2 - 47 Ω @ R3,4
____ 1 - 4.7 KΩ 8-pin SIP* bussed @ RP1
*Match pin 1 of SIP with pin 1 on the layout

SOCKETS *Match pin 1 of sockets with pin 1 (square pad) on the layout. Check that ALL pins have passed thru ALL holes

____18 - 14-pin
____30 - 16-pin
____15 - 20-pin
____ 2 - 24-pin
____ 1 - 40-pin



CAPACITORS C

____ 2 - 100 pF @ C5,6
____ 9 - 0.002 µF @ C15-18,C19-22,33
____37 - 0.1 µF Monolithic @ all other C locations
____ 2 - 10 µF/16V Tantalum* @ C49,50
*Match + of Tantalums with + on the layout

CONNECTORS

____ 1 - DE9S female 90° @ J2 video
____ 1 - DB25S female 90° @ J3 printer port

CONNECTORS (continued)

____ 1 - 1x6 header, male, straight @ J1 lightpen
____ 1 - rear panel bracket

OSCILLATOR

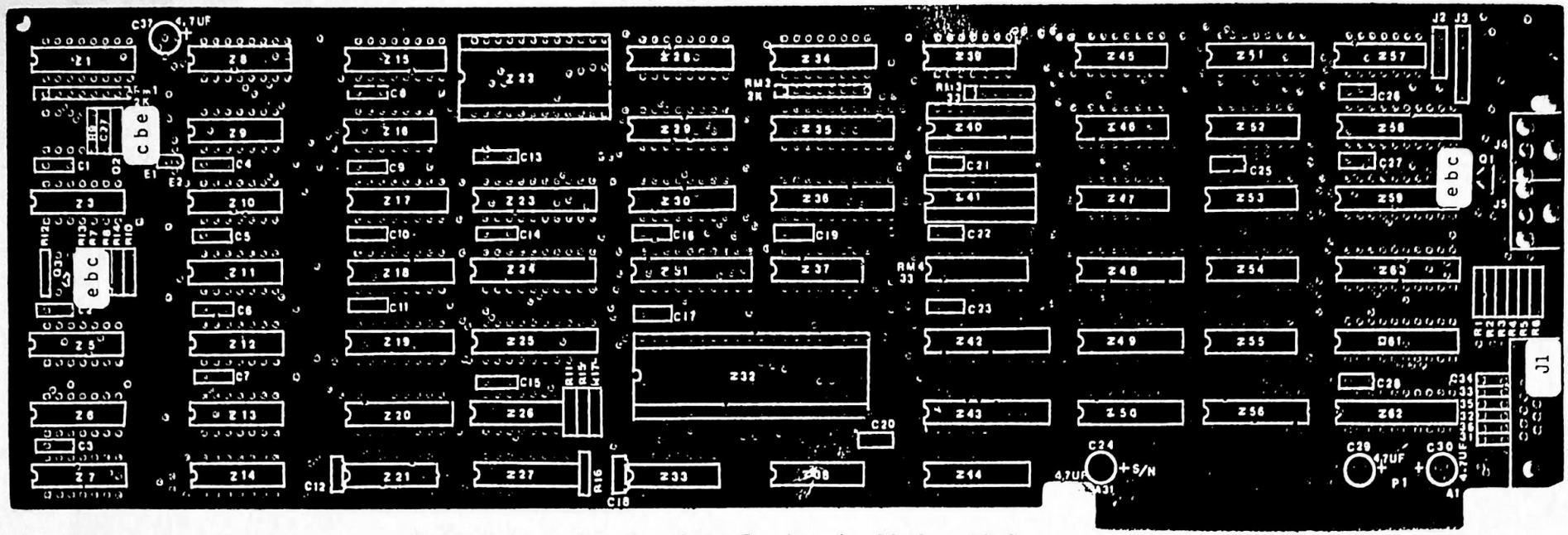
____ 1 - 16.000 MHz @ Y1* Match pin 1 of oscillator with pin 1 on the layout

MONOCHROME GRAPHICS/PRINTER CARD VERSION II (continued)

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____	1 - 74LS00	@ U10
____	2 - 74LS04	@ U28,47 *U8 is
____	1 - 74LS05	@ U46 not equipped
____	3 - 74LS08	@ U26,49,56
____	1 - 74LS27	@ U44
____	2 - 74LS125	@ U19,27
____	3 - 74LS138	@ U17,18,37
____	4 - 74LS139	@ U4,32,40,48
____	2 - 74LS151	@ U51,57
____	2 - 74LS166	@ U12,31
____	3 - 74LS174	@ U9,24,36
____	6 - 74LS244	@ U20,35,38,39,45,50
____	1 - 74LS245	@ U52
____	3 - 74LS273	@ U21,34,43
____	3 - 74LS374	@ U11,42,59
____	2 - 74LS377	@ U25,29 *Try 74LS374
____	1 - 74LS393	@ U6 @ U29
____	1 - 74175	@ U16
____	1 - 74S00	@ U15
____	1 - 74S02	@ U3
____	1 - 74S11	@ U23
____	1 - 74S32	@ U2
____	2 - 74S51	@ U53,54
____	1 - 74S64	@ U14
____	4 - 74S112	@ U1,13,30,58
____	1 - 74S157	@ U5
____	2 - 74S175	@ U7,22
____	1 - 6845	@ U55
____	1 - 6116	@ U33
____	1 - 2732	EPROM @ U41
____	8 - 4164	RAM, 150 ns @ U60,61,62,63, U64,65,66,67

GREY SCALE COLOUR GRAPHICS VIDEO: Features interface for monochrome composite or colour monitor, RF modulator, lightpen. Also translates colour information into grey scale information levels for use with monochrome composite monitor. Contains 16 K of RAM and operates in medium to hi-resolution graphics mode, or low or high resolution alphanumeric mode (40 or 80 characters by 25 rows). Requires firmware (one EPROM). Documentaion available from supplier.



Layout is reduced. Actual size is 33.6 x 10.8 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISITORS R ¼ watt, 5%

____ 1 - 27 Ω @ R8
____ 1 - 47 Ω @ R6
____ 3 - 100 Ω @ R5,10,18
____ 1 - 170 Ω @ R9
____ 1 - 220 Ω @ R7
____ 2 - 2.2 KΩ @ R4,11
____ 3 - 3.3 KΩ @ R1,14,17
____ 3 - 4.7 KΩ @ B12,R13,15
____ 1 - 5.6 KΩ @ R2
____ 1 - 9.1 KΩ @ R16
____ 1 - 13 KΩ @ R3

RESISTORS (continued)

*Match pin 1 of the following with pin 1 (square) on the layout

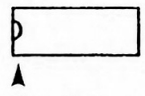
____ 2 - 3.3 KΩ 8-pin SIP* bussed @ RM1,2
____ 1 - 33 Ω 3-element SIP* isolated @ RM3
____ 1 - 33 Ω 8-element DIP* isolated @ RM4

Single 33 resistors may be substitued for the isolated resistor packs

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes before soldering

SOCKETS (continued)

____ 26 - 14-pin
____ 16 - 16-pin
____ 2 - 18-pin
____ 13 - 20-pin
____ 1 - 24-pin
____ 1 - 40-pin



CAPACITORS C

____ 1 - 100 pF @ C37
____ 6 - 47 pF @ C31,32,33,34,35,36
____ 27 - 0.1 µF Monolithic @ C1-23 C25,26,27,18

GREY SCALE COLOUR GRAPHICS VIDEO: (continued)

CAPACITORS (continued)
*Match + of the following Tantalums with + on the layout

____ 3 - 3.3 F/16V Tantalum* @ C24,30,37
____ 1 - 10 F/16V Tantalum* @ C29

TRANSISTORS Q *Position EBC transistor leads as shown on the layout

____ 3 - 2N3904 @ Q1,2,3

CONNECTORS All headers are male, straight

____ 1 - 1x2 header @ E1,2 (character set)
____ 1 - 1x4 header @ J2 (RF modulator)
____ 1 - 1x6 header @ J3 (lightpen)
____ 1 - DE9S PC mount @ J1 (RGB)
____ 2 - phono jack @ J4,5 (composite video)

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 2 - 74LS00 @ Z33,47
____ 2 - 74LS02 @ Z11,12
____ 1 - 74LS04 @ Z9
____ 1 - 74LS08 @ Z45
____ 2 - 74LS10 @ Z14,55
____ 1 - 74LS32 @ Z46
____ 2 - 74LS51 @ Z3,16
____ 5 - 74LS74 @ Z5,7,38,39,52
____ 1 - 74LS86 @ Z26

____ 1 - 74LS125 @ Z54
____ 3 - 74LS138 @ Z44,48,56
____ 1 - 74LS151 @ Z27
____ 2 - 74LS153 @ Z17,18
____ 1 - 74LS161 @ Z8
____ 1 - 74LS164 @ Z6
____ 3 - 74LS166 @ Z28,29,30
____ 2 - 74LS174 @ Z19,20
____ 1 - 74LS175 @ Z51

____ 3 - 74LS244 @ Z59,60,61
____ 1 - 74LS245 @ Z62
____ 3 - 74LS257 @ Z15,49,50
____ 5 - 74LS273 @ Z23,24,31,35,36
____ 4 - 74LS374 @ Z25,42,43,58
____ 1 - 74LS393 @ Z37

____ 1 - 74S00 @Z 13
____ 2 - 74S04 @ Z10,53
____ 2 - 74S74 @ Z21,57
____ 1 - 74S175 @ Z34

____ 1 - 2732 EPROM @ Z22
____ 1 - 6845 @ Z32
____ 2 - TMS4416 15ns (T.I.) @ Z40,41

CONNECTOR PINOUTS

J2: RF MODULATOR - with television set

colour card		modulator
1	+12V	1
2	not used	2
3	video output	3
4	logic ground	4

J3: LIGHTPEN PINOUT - with lightpen

colour card		lightpen
1	pen input	1
2	not used	2
3	pen switch	3
4	logic ground	4
5	+5V	5
6	+12V	6

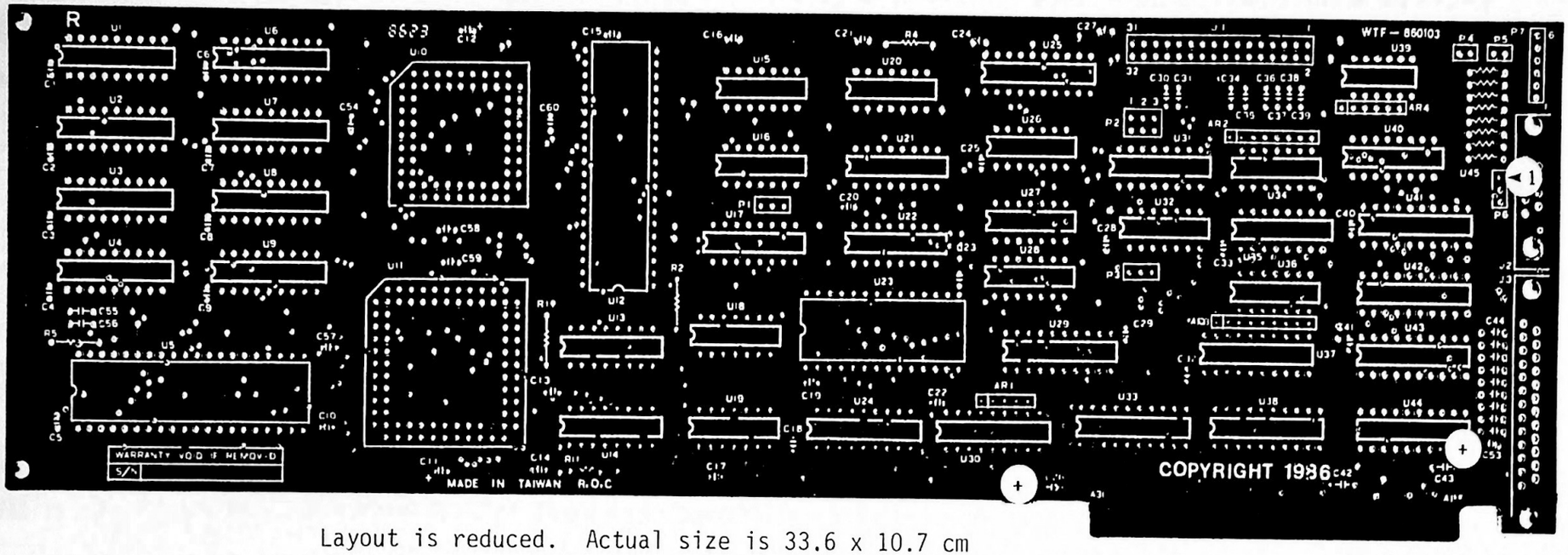
J4: PHONO JACK - with composite video monitor
J5:

colour card		video monitor
1	peak-to-peak AMP	1
2	chassis ground	2

J1: DIRECT DRIVE - with direct drive monitor (RGB)

colour card		monitor
1	ground	1
2	ground	2
3	red	3
4	green	4
5	blue	5
6	intensity	6
7	reserved	7
8	horizontal drive	8
9	vertical drive	9

ACTION FAST EGA/PRINTER VIDEO: Compatible with: Enhanced Graphics (EGA), Color Graphics (CGA), & Monochrome Display (MDA) Adapters. Supports: 640x350 & 720x348 in Mono mode (Hercules Graphics); 640x350 (64 colors) & 640x200 (16 colors) in color mode; light pen; parallel printer port; 256K RAM. Requires firmware (one EPROM, two PROMs) & four custom VLSI ICs. Documentation & schematics available from supplier.



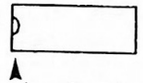
Layout is reduced. Actual size is 33.6 x 10.7 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5% *R3, R6-10 are NOT shown
____ 1 - 24 Ω @ R4
____ 1 - 51 Ω @ R2
____ 1 - 200 Ω @ R5
____ 1 - 510 Ω @ R1
____ 1 - 2.2 KΩ @ R11
____ 8 - 33 Ω individual resistors @ U45

*Match pin 1 of the following bussed SIPs with pin 1 (square) on layout
____ 1 - 4.7 KΩ 5-pin @ AR1
____ 1 - 4.7 KΩ 6-pin @ AR2
____ 1 - 4.7 KΩ 8-pin @ AR4
____ 1 - 4.7 KΩ 9-pin @ AR3

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes
____10 - 14-pin
____ 8 - 16-pin
____10 - 18-pin
____ 9 - 20-pin
____ 1 - 24-pin
____ 2 - 40-pin
____ 1 - 68-pin Chip Carrier
____ 1 - 84-pin Chip Carrier



CAPACITORS C *C14,42,43,55 not equipped
____ 1 - 30 pF @ C56
____ 8 - 47 pF @ C30,31, C34 to C39

CAPACITORS (continued)
____ 9 - 0.0022 µF @ C44 to C52
____34 - 0.1 µF Monolithic @ C1-10,13,15-25, @ C27-29,32,33,40, @ C41,54,57-60
____ 4 - 10 µF/16V Tantalum* @ C11,12,26,53 *Note polarity

OSCILLATOR *Note pin 1
____ 1 - 16.257 MHz @ U28

SWITCH *Refer to documentation for switch settings
____ 1 - 6-position DIP @ U39

ACTION FAST EGA/PRINTER VIDEO: (continued)

HEADERS male,straight

*Pins are numbered from left to right

____ 1 - 1x3 @ P1 BIOS select strap 2-3
____ 1 - 2x4 @ P2 Printer port select strap 2
____ 1 - 1x3 @ P3 Ready line select strap 2-3
____ 1 - 1x2 @ P4 Video jack
____ 1 - 1x2 @ P5 External video output
____ 1 - 1x3 @ P6 Monitor select strap 1-2 for color strap 2-3 for EGA
____ 1 - 1x6 @ P7 Lightpen

CONNECTORS

____ 1 - 2x16 header, female @ J1 Feature connector
____ 1 - DE9S 90° PCB mount, short @ J2 Video
____ 1 - DB25S 90° PCB mount, short @ J3 Printer port

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS02 @ U36
____ 2 - 74LS04 @ U16,27
____ 1 - 74LS05 @ U34
____ 1 - 74LS10 @ U26
____ 1 - 74LS11 @ U20
____ 1 - 74LS27 @ U18
____ 1 - 74LS32 @ U15
____ 1 - 74LS74 @ U19
____ 1 - 74LS125 @ U32
____ 3 - 74LS138 @ U13,14,31
____ 1 - 74LS153 @ U21
____ 1 - 74LS155 @ U40
____ 1 - 74LS174 @ U35

INTEGRATED CIRCUITS (continued)

____ 1 - 74LS175 @ U22
____ 1 - 74LS240 @ U41
____ 4 - 74LS244 @ U25,33,38,42
____ 2 - 74LS245 @ U37,44
____ 1 - 74LS273 @ U29
____ 1 - 74LS367 @ U17
____ 1 - 74LS374 @ U43

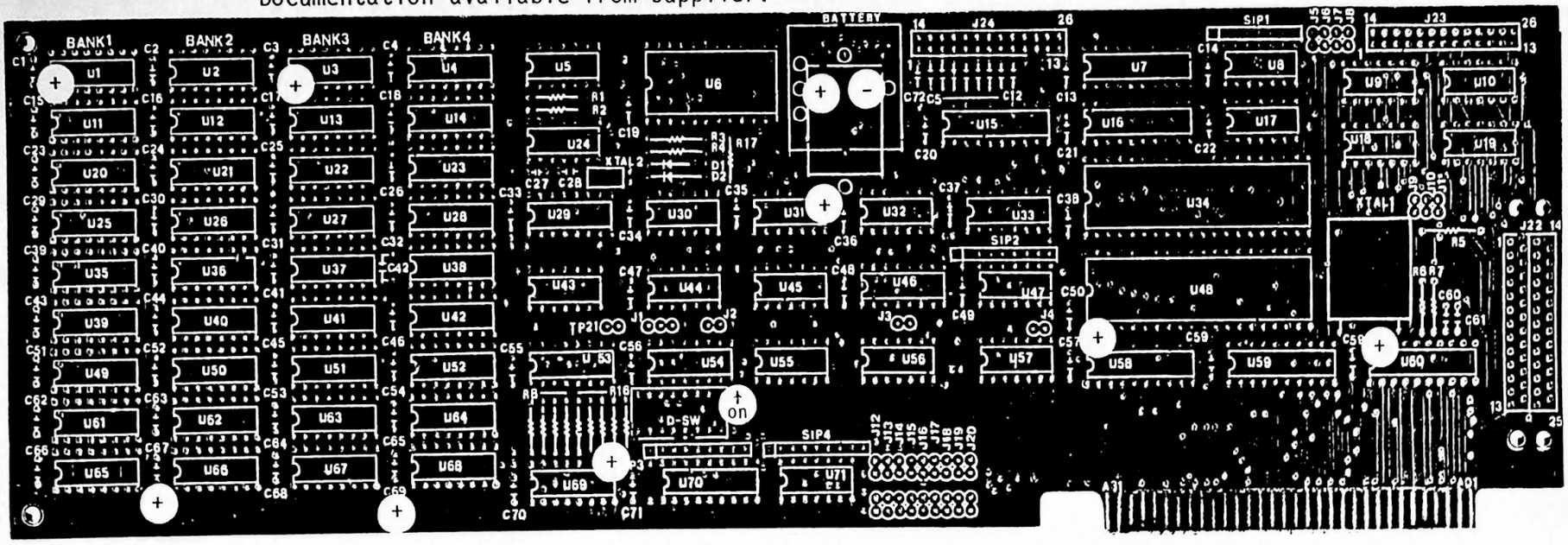
____ 8 - 41464 DRAM 150 ns @ U1 to 4 @ U6 to 9
____ 2 - 74S573 PROM @ U24,30
____ 1 - 27128 EPROM @ U23

The following VLSI custom ICs are from Chip and Technologies

____ 1 - P82C431 @ U10
____ 1 - P82C432 @ U5
____ 1 - P82C433 @ U12
____ 1 - P82C434A @ U11

NuScope Associates

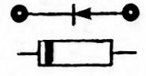
MULTIFUNCTION CARD: Provides: RAM memory expansion from 64 K to 256 K (increments of 64 K); clock/calendar (battery backed); one Centronics parallel printer port; two RS232 asynchronous communication ports. With power off, install in any slot. Requires software (one DOS disk) & firmware (two PROMs). Documentation available from supplier.



Layout is reduced. Actual size is 33.3 x 11.5 cm.

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

DIODES *Position banded end (cathode) of diodes as shown



____ 2 - IN4148

RESISTORS R ¼ watt, 5%

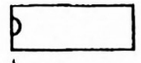
____ 9 - 22 Ω @ R8,9,10,11,12,13,14,15,16
____ 1 - 220 Ω @ R3
____ 1 - 680 Ω @ R5
____ 1 - 1.5 KΩ @ R7
____ 1 - 2.7 KΩ @ R2
____ 1 - 4.7 KΩ @ R1
____ 1 - 10 KΩ @ R4
____ 1 - 100 KΩ @ R17

RESISTORS (cont)

____ 1 - 1 MΩ @ R6
____ 4 - 4.7 KΩ 9-pin SIP* @ SIP 1,2,3,4
*Match pin 1 of SIPs with pin 1 (square pad) on the layout

SOCKETS *Match pin 1 of sockets with pin 1 (square soder pad) on the layout. Check that ALL pins have passed thru ALL holes

____ 19 - 14-pin
____ 42 - 16-pin
____ 1 - 18-pin
____ 6 - 20-pin
____ 1 - 24-pin
____ 2 - 40-pin



CAPACITORS C

____ 2 - 18 pF @ C27,28
____ 1 - 22 pF @ C60
____ 1 - 47 pF @ C61
____ 9 - 470 pF @ C5,6,7,8,9,10,11,12,72
____ 8 - 4.7 µF/25V Tantalum* @ C1,3,36, C57,59,67,69,71
*Match + of Tantalum with + on the layout
____ 50 - 0.1 µF Monolithic @ all other positions

SWITCH

____ 1 - 8-position DIP @ D-SW

MULTIFUNCTION CARD (cont)

BATTERY

____ 1 - 3.6V NiCd, rechargable @ BATTERY *Match + & - terminals of battery with + & - on the layout

CRYSTALS Y *Fold crystals flat against the card before soldering

____ 1 - 32.768 KHz @ Y2
____ 1 - 1.8432 MHz @ Y1

CONNECTORS

____ 1 - DB25 male, 90°, PCB mount @ J22 (serial port #1)
____ 2 - 2x13 male header strip, straight, @ J23 (serial port # 2), & @ J24 (parallel port)
____ 4 - 1x2 male header strip, straight, @ TP21,J2,3,4
____ 1 - 1x3 male header strip, straight, @ J1
____ 1 - 2x4 male header strip, statight, @ J5,6,7,8
____ 1 - 2x3 male header strip, straight, @ J9,10,11
____ 2 - 2x9 male header strip, straight, @ J12-20
____ - - shorting clips
____ 1 - rear panel adapter

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 (square pad) on the layout

____ 1 - 74LS04. @ U32
____ 1 - 74LS05 @ U47
____ 2 - 74LS08 @ U24,71
____ 2 - 74LS14 @ U43,44
____ 1 - 74LS21 @ U30
____ 3 - 74LS32 @ U17,45,56
____ 1 - 74LS74 @ U55
____ 2 - 74LS125 @ U31,57
____ 1 - 74LS138 @ U46
____ 1 - 74LS139 @ U29
____ 1 - 74LS174 @ U33
____ 1 - 74LS240 @ U15
____ 3 - 74LS244 @ U7,58,59
____ 1 - 74LS245 @ U60
____ 1 - 74LS280 @ U5
____ 1 - 74LS374 @ U16
____ 2 - 74S157 @ U53,69
____ 1 - 1488 @ U18
____ 2 - 1489 @ U8,19
____ 1 - 58167 @ U6
____ 1 - 8250 @ U48
____ 1 - 82S129 @ U54 PROM
____ 1 - 17S33 @ U70 PROM
____ 36 - 4164 DRAM, 200 ns @ BANK 1,2,3,4

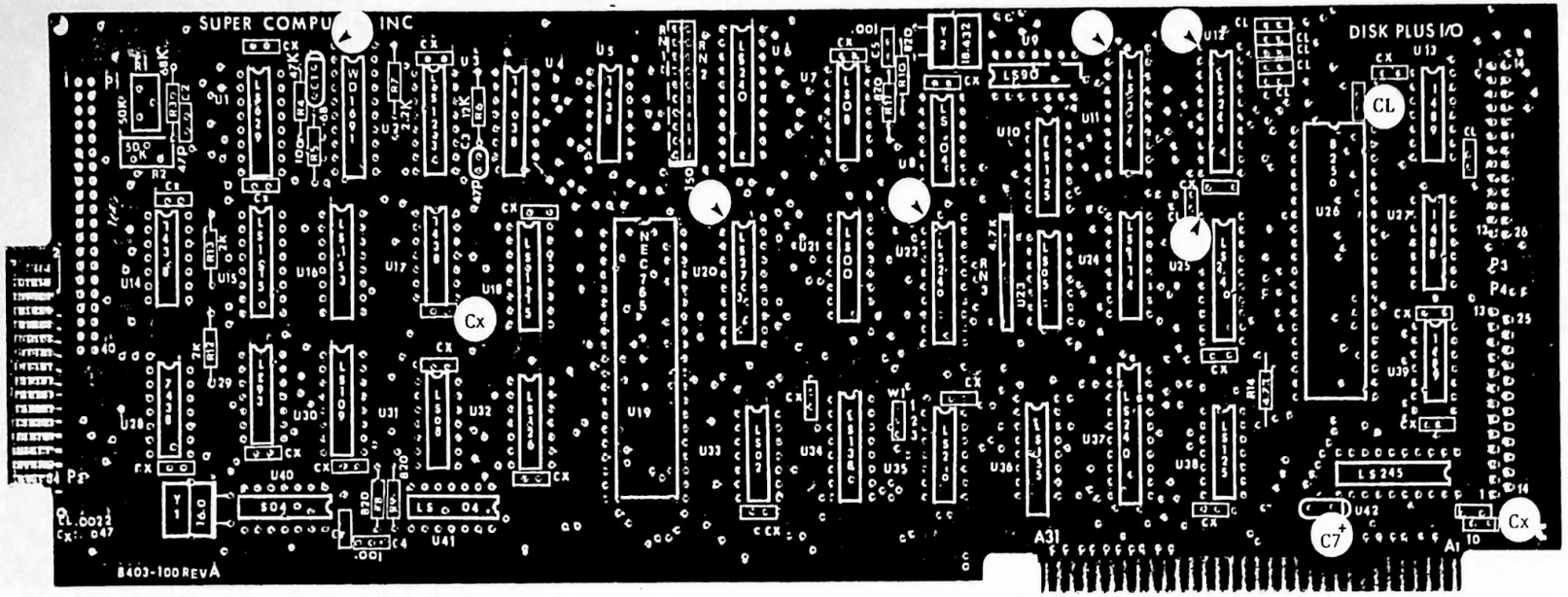
For second serial port add:

____ 1 - 1488 @ U9
____ 1 - 1489 @ U10
____ 1 - 8250 @ U34

For pinouts for the various functions, refer to the documentation avaialble from the suppliers

NuScope Associates

SUPER DISK PLUS I/O CARD: A general purpose card used to interface the computer to: a) up to four 5¼" floppy disk drives, b) one parallel printer, and c) one asynchronous serial device. With power off, install in any available slot. Documentation and schematics are available from the supplier.



Arrows on the layout indicate pin 1

SUGGESTED SEQUENCE *INDICATES A PRECAUTION Layout is reduced. Actual size is 29.9 x 11.7 cm.

RESISTORS R ¼ watt, 5%

____ 1 - 100 Ω @ R5
____ 4 - 820 Ω @ R9,10,11
____ 2 - 2 KΩ @ R12,13
____ 1 - 2.2 KΩ @ R7
____ 1 - 4.7 KΩ @ R14
____ 1 - 12 KΩ @ R6
____ 1 - 47 KΩ @ R4
____ 1 - 68 KΩ @ R3
____ 2 - 50 KΩ Trimpot @ R1,2

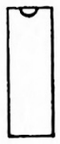
*Match pin 1 of the following SIPs with pin 1 (solid line) on the layout

____ 2 - 150 Ω 10-pin SIP @ RN1,2
____ 1 - 4.7 KΩ 8-pin SIP @ RN3

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____21 - 14-pin
____10 - 16-pin
____ 9 - 20-pin
____ 2 - 40-pin

pin 1 ➤



CAPACITORS C

____ 2 - 47 pF @ C2,3
____ 2 - 0.001 µF @ C4,5
____ 8 - 0.0022 µF @ CL
____23 - 0.1 µF Monolithic @ Cx
____ 1 - 0.68 µF/25V Tantalum* @ C1
____ 1 - 10 µF/25V Tantalum* @ C7

* ⊖ +

CRYSTALS Y *Fold crystals flat against the card before soldering. Solder the case to the grounding pads

____ 1 - 16.0000 MHz @ Y1
____ 1 - 18.432 MHz @ Y2

SUPER DISK PLUS I/O CARD (continued):

CONNECTORS

____ 1 - 1x3 header, male, straight @ W (1&2 com 1, 2&3 com 2)
____ 1 - 2x20 header, male, straight @ P1 (Drive C & D)
____ 1 - 2x13 header, male, straight @ P3 (Parallel port)
____ 1 - DB25S 25-pin female, 90° PCB mount, @ P4 (Serial)
____ 1 - rear panel adapter
____ 1 - jumper plug

ADJUSTMENT:

Power up system with drive cables disconnected.
Verify that U2 pin 8 is high (3-4V).
Adust R2 trimmer for 1.4V @ U1 pin 2.
Adjust R1 trimmer for 4 MHz @ pin 7 of U1 (250 ns)

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00, @ U21
____ 1 - 74LS02 @ U33
____ 1 - 74LS04 @ U41
____ 1 - 74LS05 @ U23
____ 2 - 74LS08 @ U7,31
____ 1 - 74LS20 @ U35
____ 1 - 74LS90 @ U9
____ 1 - 74LS93 @ U29
____ 1 - 74LS109 @ U30
____ 1 - 74LS123 @ U3
____ 2 - 74LS125 @ U10,38
____ 1 - 74LS126 @ U32
____ 1 - 74LS138 @ U34
____ 1 - 74LS153 @ U16
____ 1 - 74LS155 @ U36
____ 1 - 74LS174 @ U24
____ 2 - 74LS175 @ U15,18
____ 4 - 74LS240 @ U6,22,25,37
____ 1 - 74LS244 @ U12
____ 1 - 74LS245 @ U42
____ 1 - 74LS273 @ U20
____ 1 - 74LS374 @ U11
____ 1 - 74LS629 @ U1

____ 2 - 74S04 @ U8,40

____ 5 - 7438 @ U4,5,17,28
____ 1 - 1488 @ U27
____ 2 - 1489 @ U13,39

____ 1 - INS8250 @ U26 (NAT)
____ 1 - NEC765 @ U19 (NEC)
____ 1 - WD1691 @ U2 (Western Digital)

PARALLEL PORT:

Parallel port address is configured as LPT2:(378-37F).
To reconfigure as LPT1: (278-27F)

i cut trace between pin 10 of U34 and pin 2,14 of U36
ii strap pin 14 of U34 to pin 2,14 of U36

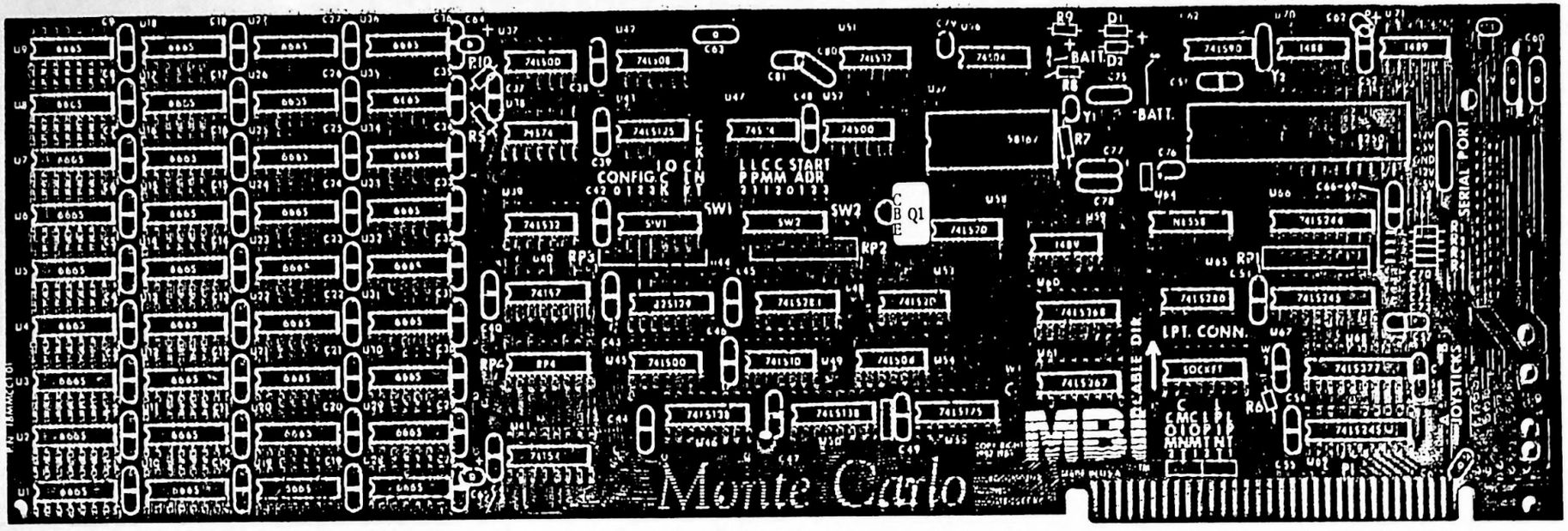
STANDARD IBM DRIVE CABLING:

i Signals on drives A & C, pins 10 to 16 are swapped at the connector attached to the rear of drive as follows:

10	to	16
11	to	15
12	to	14
13	to	13
14	to	12
15	to	11
16	to	10

ii All drives are jumpered for MPX, HL, DS1
iii Terminating R-pacs are removed from drives B and D

MONTE CARLO CARD: Features: RAM Memory expansion from 64 K to 1 M bytes; one RS-232C Asynchronous Communication Port, programmable from 50 to 9,600 baud; one Centronics parallel printer port; battery-backed clock/calender, with alarm features; two joystick ports. Requires software (one disk) and firmware (one PROM).. Documentaion and schematics are available from supplier.



SUGGESTED SEQUENCE *INDICATES A PRECAUTION Layout is reduced. Actual size is 33.5 x 11.8 cm

DIODES D *Position banded end (cathode) of diode as shown

____ 1 - 1N6263 @ D1
____ 1 - 1N4454 @ D2

RESISTORS R ¼ watt, 5%

____ 2 - 33 Ω @ R5,10
____ 2 - 470 Ω @ R8,9
____ 1 - 1 KΩ @ R6
____ 4 - 2.2 KΩ @ R1,2,3,4
____ 1 - 200 KΩ @ R7 *Install only if using "mini" crystal @ Y1
____ 1 - 33 Ω 8-resistor DIP @ RP4 Install in socket. Eight single resistors may be substituted

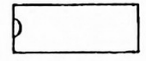
RESISTORS (continued)

*Match pin 1 of the following SIP RNs with pin 1 (1) on the layout

____ 1 - 1 KΩ 9-pin SIP @ RP1
____ 2 - 2 KΩ 9-pin SIP @ RP2,3

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____19 - 14-pin
____48 - 16-pin
____ 4 - 20-pin
____ 1 - 24-pin
____ 1 - 40-pin



CAPACITORS C

____ 1 - 22 pF @ C77
____ 4 - 33 pF @ C70,71,72,73
____ 2 - 220 pF @ C50,80
____ 1 - 0.001 F @ C81
____13 - 0.01 µF @ C51,52,53,54,55, C56,57,58,66,67 C68,69,76
____51 - 0.1 µF Monolithic @ C1 to 49, C75,79
____ 7 - 10 µF/25V Radial @ C59,60,61,62,63, C64,65

*Match + with + on layout

____ 1 - 5-50 pF Trimcap @ C78

MONTE CARLO CARD (continued)

TRANSISTOR Q *Match EBC transistor leads with EBC in the layout

____ 1 - 2N3904

CRYSTAL Y

____ 1 - 32.768 KHz @ Y1* Install R7 only if using "mini" crystal

____ 1 - 18.4320 MHz @ Y2* Install on solder side. Secure body of crystal to solder side with double-sided tape

SWITCH

____ 2 - 8-position DIP

BATTERY

____ 1 - 3.0 VDC Hi-Energy Lithium of appropriate size. Match + of battery with + on layout

CONNECTORS

____ 1 - 1x6 header, male, straight, below SOCKET, for COM1,2 & LPT 1,2 select

____ 1 - 1x5 header, male, straight, near SERIAL PORT, as voltage test pins (not required)

____ 1 - DB25P male, 90°, PCB mount @ SERIAL PORT

____ 2 - modular telephone jacks, 6-conductor, PCB mount, @ JOYSTICKS A & B

____ 1 - 16-pin socket @ SOCKET for prallel port interface

NOT EQUIPPED:
W1
W2
3-pin between U30 & C49
2-pin between C76 & C77

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 2 - 74LS00 @ U37,45
____ 2 - 74LS08 @ U42,54
____ 1 - 74LS10 @ U49
____ 2 - 74LS20 @ U53,58
____ 2 - 74LS32 @ U39,51
____ 1 - 74LS90 @ U62
____ 1 - 74LS125 @ U43 (74125)
____ 2 - 74LS138 @ U46,50
____ 1 - 74LS175 @ U55
____ 1 - 74LS244 @ U66
____ 2 - 74LS245 @ U67,69
____ 1 - 74LS280 @ U65
____ 1 - 74LS283 @ U48
____ 1 - 74LS367 @ U61
____ 1 - 74LS368 @ U60
____ 1 - 74LS377 @ U68

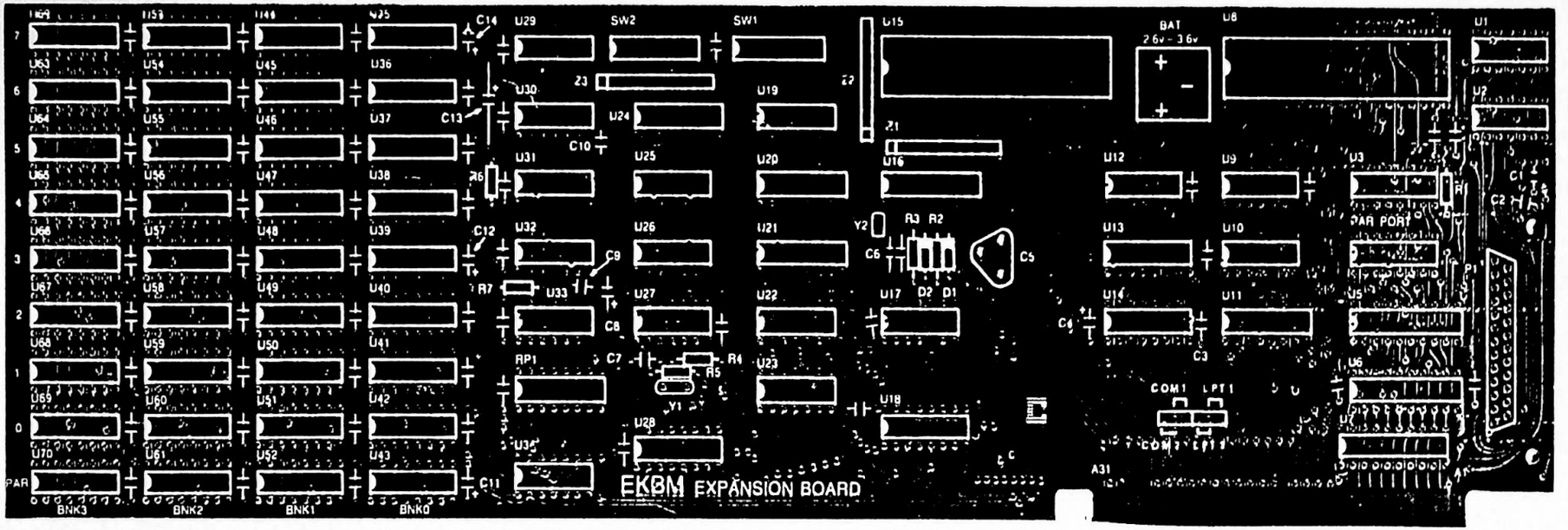
____ 1 - 74S00 @ U52
____ 1 - 74S04 @ U56
____ 2 - 74S74 @ U38,47

____ 1 - 74157 @ U40,41

____ 1 - NE558 @ U64
____ 1 - 1488 @ U70
____ 2 - 1489 @ U59,71
____ 1 - MM58167 @ U57 (NAT)
____ 1 - 8250 @ U63
____ 1 - 82S129 (PROM) @ U44
____ 36 - 4164 DRAM, 200 ns @ U1 to 36

For pinouts for various functions, refer to the documentation available from the supplier.

EKBM EXPANSION BOARD: Features include: RAM expansion from 64 K to 256 K, in increments of 64 K; clock/calendar with battery backup; one Centronics parallel port; one Asynchronous (RS232) communication port. With power off, install in any available slot. Requires software (one disk) and firmare (one PROM).



SUGGESTED SEQUENCE *INDICATES A PRECAUTION

Layout is reduced. Actual size is 33.5 x 10.6 cm.

DIODES D *Position banded (cathode) end of diode at the bar on the layout

____ 2 - 1N4148 @ D1,2

RESISTORS R ¼ watt, 5%

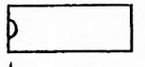
____ 2 - 33 Ω @ R6,7
____ 1 - 100 Ω @ R3
____ 1 - 220 Ω @ R2
____ 2 - 470 Ω @ R4,5
____ 1 - 3.9 KΩ @ R1
____ 3 - 3.3 KΩ 10-pin SIP* @ Z1,2,3
*Match pin 1 of SIPs with pin 1 (square) on the layout
____ 1 - 33 Ω 16-pin DIP @ RP1, solder directly to the card

RESISTORS (continued)

eight 33 Ω resistors may be substituted for the 16-pin DIP

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 18 - 14-pin
____ 47 - 16-pin
____ 1 - 18-pin
____ 3 - 20-pin
____ 2 - 40-pin



CAPACITORS C

____ 1 - 22 pF @ C6
____ 1 - 100 pF @ C3

CAPACITORS (continued)

____ 1 - 220 pF @ C9
____ 3 - 500 pF @ C1,2,7
____ 1 - 0.001 µF @ C10
____ 53 - 0.1 µF Monolithic
____ 5 - 10 µF/15V Tantalum* @ C4,8,11,12,14
____ 1 - 50 µF /15V Axial* @ C13
*Match + of Tantalums and Axial with + on the layout
____ 1 - 5-30 pF Trimcap @ C5

SWITCH

____ 2 - 8-position DIP @ SW1,2

EKBM EXPANSION BOARD (continued)

BATTERY

____ 1 - 3.6V NiCad @ BAT
*Match + of battery with + on the layout

CRYSTAL Y

____ 1 - 32.768 KHz @ Y2
____ 1 - 18.432 MHz @ Y1

CONNECTORS

____ 1 - 1x6 header, male, straight @ COM 1, LPT 1 (serial/parallel select)
____ 2 - Berg shorting clips
____ 1 - DB25P 90°, PCB mount @ P1 (serial port)
____ 1 - 16-pin socket @ PAR. PORT (parallel port)
____ 1 - ribbon cable with appropriate connectors and length
____ 1 - rear panel adapter

PARALLEL PORT CABLE PIN OUT

@ 16-pin socket	@ DP25S CONNECTOR
1	2
2	4
3	5
4	7
5	9
6	11
7	13
8	25
9	24
10	12
11	10
12	8
13	6
14	16
15	3
16	1

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 2 - 74LS00 @ U12,30
____ 2 - 74LS08 @ U19,25
____ 1 - 74LS10 @ U23
____ 3 - 74LS32 @ U10,22,29
____ 1 - 74LS90 @ U17
____ 1 - 74LS125 @ U33
____ 3 - 74LS138 @ U13,20,21
____ 1 - 74LS175 @ U11
____ 2 - 74LS245 @ U6,7
____ 1 - 74LS280 @ U34
____ 1 - 74LS367 @ U3
____ 1 - 74LS368 @ U14
____ 1 - 74LS377 @ U5

____ 1 - 74S00 @ U26
____ 1 - 74S04 @ U27
____ 2 - 74S74 @ U31,32

____ 2 - 74157 @ U18,28

____ 1 - 1488 @ U1
____ 2 - 1489 @ U2,9
____ 1 - MSM5832 (OKI.) @ U16
____ 1 - 8250-B @ U8
____ 1 - 8255A-5 @ U15
____ 36 - 4164 DRAM, 200 ns @ BNK Ø,1,2,3
____ 1 - 82S129 PROM @ U24

SWITCH SETTINGS - SW1

SW1	position
parity on	1 on
clock on	2 on
not used	3 -
par port on	4 on

	par addr 5	par addr 6	ser addr 7	ser addr 8
LPT 1	off	on	-	-
LPT 2	on	off	-	-
COM 1	-	-	on	off
COM 2	-	-	off	on
COM port disabled	-	-	off	off

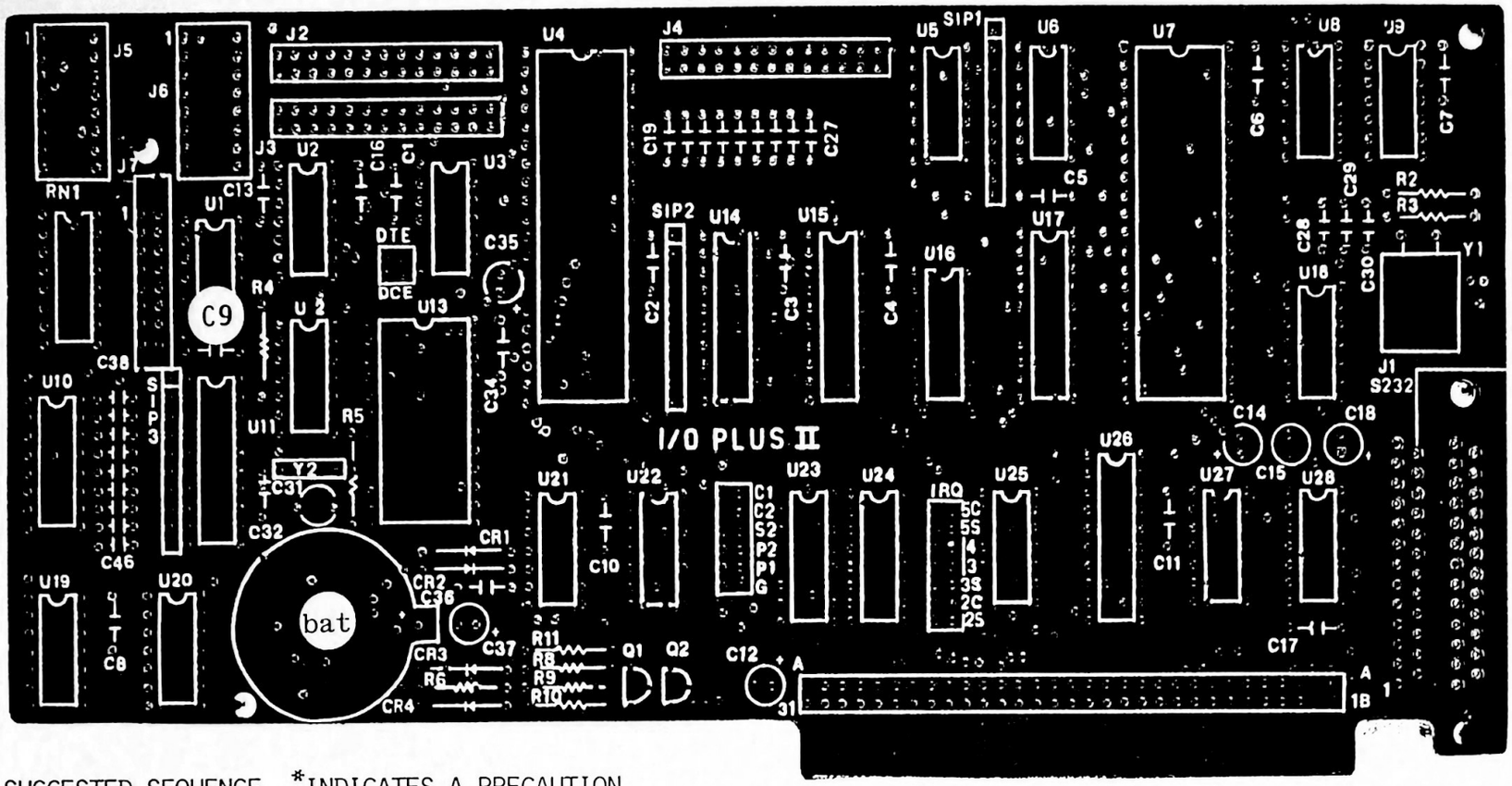
Strap at 1x6 header for COM 1,2 & LPT1,2

SWITCH SETTINGS - SW2

	RAM (K)	1	2	3	4
starting address	256	on	off	on	on
installed memory	64	off	off	off	on
	128	off	off	on	on
	192	off	on	on	on
	256	on	on	on	on

CLOCK ADJUSTMENT
Pin 9 of U15 adjust for 976.5625 KHz

I/O PLUS II: Features include: two RS-232 Asynchronous serial ports; one Centronics parallel port; battery-backed clock/calendar; three game ports. Requires software (one disk) and firmware (one PROM).



Actual size
21.6 x 10.6 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

DIODES D *Polarity of CR1,2,3,4 are incorrectly drawn on SOME cards. Position banded end of diode towards the arrow as shown on the layout

____ 4 - 1N4148 @ CR1,2,3,4

RESISTORS R ¼ watt, 5% *R1,7 are not equipped

____ 2 - 1 KΩ @ R2,3
____ 1 - 12 KΩ @ R4
____ 1 - 4.7 KΩ @ R6
____ 3 - 33 KΩ @ R8,9,10
____ 1 - 100 KΩ @ R11
____ 1 - 150 KΩ @ R5

RESISTORS (continued)

____ 1 - 2.2 KΩ 16-pin DIP @ RN1 *Solder directly to the card. Eight single 2.2 KΩ resistors may be substituted

Match pin 1 of the following SIPs with pin 1 on the layout

____ 1 - 2.2 KΩ 10-pin SIP @ SIP1
____ 2 - 4.7 KΩ 10-pin SIP @ SIP2,3

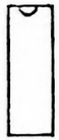
SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 16 - 14-pin

SOCKETS (continued)

____ 16 - 14-pin
____ 6 - 16-pin
____ 6 - 20-pin
____ 1 - 24-pin
____ 2 - 40-pin

pin 1 ➤



CAPACITORS C

____ 1 - 18 pF @ C32
____ 4 - 47 pF @ C38,39,40,42
____ 1 - 50 pF @ C29

I/O PLUS II (continued)

CAPACITORS (continued)

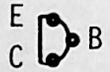
____ 1 - 100 pF @ C28
____ 9 - 0.0022 µF @ C19,20,21,22,23,24
C25,26,27,
____ 6 - 0.01 µF @ C30,41,43,44,45,46
____16 - 0.1 µF Monolithic @ C1,2,3,
C4,5,6,7,8,9*,10,11,13,
C16,17,34,36,
____ 6 - 10 µF/25V Tantalum* @ C12
C14,15,18,35,37
*Match + of Tantalums
with + on the layout
____ 1 - 5-50 pF Trimcap @ C31

CRYSTAL Y

____ 1 - 32.768 KHz @ Y2
____ 1 - 18.432 MHz @ Y1 Fold crystal flat against the card before soldering

TRANSISTOR Q *Match EBC transistor leads as shown

____ 1 - 2N3904 (2SC9014A) @ Q1
____ 1 - 2N3906 @ Q2



BATTERY

____ 1 - 3.6V NiCad rechargeable (Varta 3/60 DK) @ BAT

HEADERS All male, straight

____ 1 - 2x2 @ DTE/DCE
____ 1 - 2x6 @ C1 - G
____ 1 - 2x7 @ IRQ
____ 1 - 2x8 @ J7 (game)
____ 3 - 2X13 @ J2,3 (serial)
@ J4 (parallel)

CONNECTORS

____ 1 - DB25P male @ J1 (serial)
____ - - jumper plugs
____ 1 - rear panel adapter

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

*ICs @ U2,3,4 are for second serial port

____ 2 - 74LS04 @ U6,18
____ 2 - 74LS05 @ U1†,5 Equip U1 with
____ 1 - 74LS08 @ U21 74LS05 when using
____ 1 - 74LS20 @ U20 Apple-type joystick
____ 2 - 74LS32 @ U19,22
____ 1 - 74LS90 @ U8
____ 2 - 74LS125 @ U12,25
____ 1 - 74LS138 @ U24
____ 1 - 74LS174 @ U16
____ 1 - 74LS240 @ U17 (T.I.)
____ 1 - 74LS245N @ U26 (T.I.)
____ 1 - 74LS374 @ U15

____ 2 - 74HCT244-2N @ U11,14 (Zytrex) (74LS244)
____ 1 - NE558 @ U10
____ 2 - MC1488 @ U2,28
____ 3 - MC1489 @ U3,9,27
____ 2 - INS8250 @ U4,7
____ 1 - MM58167AN @ U13
____ 1 - MB7052 (82S129) PROM @ U23

PORT FUNCTIONS *Pin 1 is recognized by a "1" or a square pad

J1 serial port #1
J2,3 serial port #2
J4 parallel port
J5,6 two Apple-type joystick ports
J7 one IBM-type joystick port

†Remove IC 74LS05 from U1 when using IBM-type joystick

I/O CONFIGURATION

I DTE/DCE: Strap DTE for J2 use
Strap DCE for J3 use

II IRQ:

5C	IRQ5	clock
5S	IRQ5	serial port #2
4	IRQ4	serial port #1
3	IRQ3	serial port #1
3S	IRQ3	serial port #2
2C	IRQ	clock
2S	IRQ2	serial port #2

III

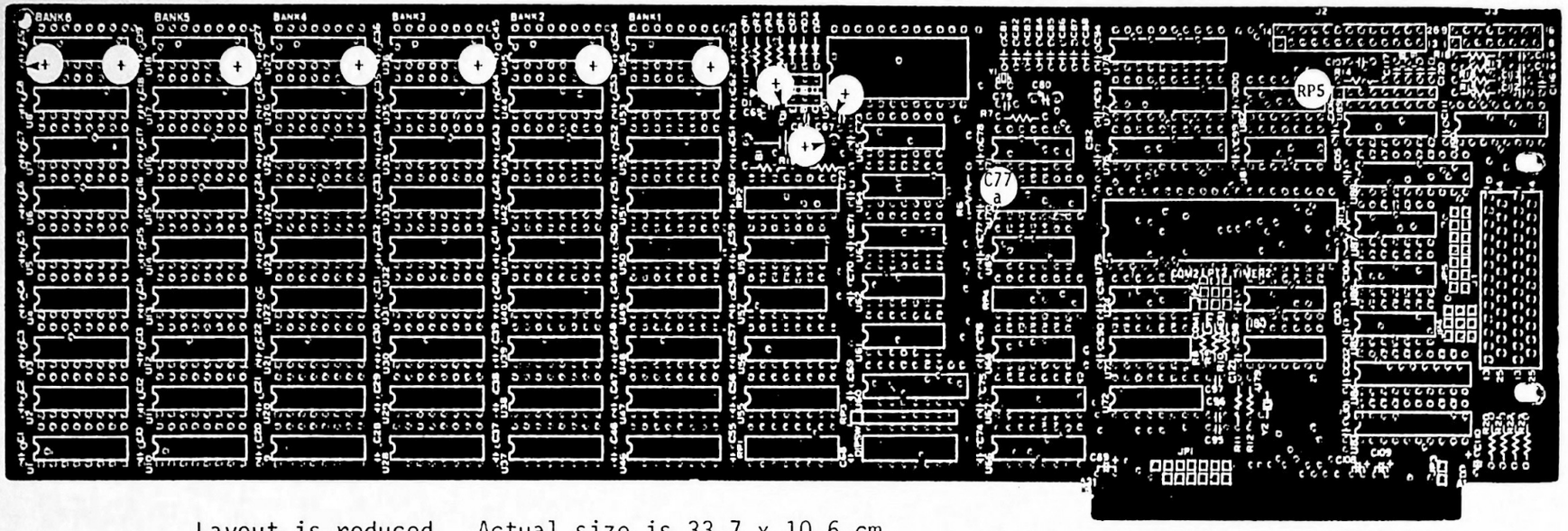
C1	serial port #1 com 1
C2	serial port #1 or 2 com 2
S2	serial port #2
P2	LPT2
P1	LPT1
G	game

SUGGESTED CONFIGURATION

Equip jumper plugs at:

DTE
C1
P1
G
IRQ4

384 K MULTIFUNCTION: Provides: 64 to 384 K of RAM memory expansion; RS-232 asynchronous serial communication port; Centronics parallel port; real-time/clock-calendar with battery backup; game adapter port; software-controlled RAMDISK and PSPOOL. Requires firmware (two PROMs) and software (one diskette). Documentaion and schematics available from supplier.



Layout is reduced. Actual size is 33.7 x 10.6 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

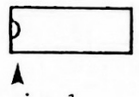
DIODES D *Position banded end of diode towards the arrow on the layout
____ 3 - IN914 @ D1,2,3 *resistor @ D4*

RESISTORS R ¼ watt, 5%
____ 2 - 1 KΩ @ R11,12
____ 1 - 1.5 KΩ @ D4* 1/8 watt
____ 4 - 2.2 KΩ @ R15,16,17,18
____ 11 - 4.7 KΩ @ R4,6,8,9,10,13,19,20 R21,22,23
____ 2 - 10 KΩ @ R5,14
____ 3 - 33 KΩ @ R1,2,3
____ 1 - 150 KΩ @ R7

RESISTORS (continued)
____ 3 - 22 Ω 16-pin DIP resistor pak* @ RP1,2,4 *eight 22 Ω resitors may be substituted for each pak
____ 2 - 4.7 KΩ 9-pin SIP* bussed @ RP3,5 *Match pin 1 of SIP with pin 1 (square) on the layout

SOCKETS *Match pin 1 of sockets with pin 1 (square pad) on the layout. Check that ALL pins have passed thru ALL holes
____ 17 - 14-pin
____ 63 - 16-pin

SOCKETS (continued)
____ 1 - 18-pin
____ 6 - 20-pin
____ 1 - 24-pin
____ 1 - 40-pin



CAPACITORS C
____ 1 - 18 pF @ C79
____ 5 - 47 pF @ C96,117,118,119,120
____ 1 - 100 pF @ C97
____ 1 - 0.001 µF @ C95
____ 9 - 0.0022 µF @ C81,82,83,84,85, C86,87,88,107
____ 5 - 0.01 µF @ C112,113,114,115,116
____ 1 - 1-35 pF Trimcap @ C80

384 K MULTIFUNCTION (continued)

CAPACITORS (continued)

____84 - 0.1 µF Monolithic @ C1-8,10-18, C20-26,28-35,37-44,46-53,55-62, C66,68-78(including C77A), C90-93,98-106,111,121

____13 - 10 µF/16V Tantalum* @ C9,19, C27,36,45,54,63,65,67,89,108, C109,110 *Match + of Tantalum with + on layout

TRANSISTORS Q *Match EBC leads of transistors with EBC on the layout

____ 1 - 2N2907 @ Q1
____ 1 - 2N2222 @ Q2

CRYSTALS Y

____ 1 - 32.768 KHz @ Y1
____ 1 - 18.432 MHz @ Y2* Fold crystal flat against the card before soldering. Solder case to the card

SWITCH

____ 1 - 8-postion DIP @ DIPSW

BATTERY *Match + of battery with + on the layout

____ 1 - 3.6 VDC NiCad rechargeable @ B1

HEADERS All male straight

____ 1 - 2x6+1 @ JP1
____ 2 - 3x3 @ JP2,4
____ 1 - 1x2 @ JP3
____ 1 - 2x7 @ JP5
____ 1 - 1x13 @ J2 (joystick port)
____ 1 - 2x8 @ J3 (parallel port)

CONNECTORS

____ 1 - DB25S 25-pin female 90° @ J1
____ 1 - rear panel bracket

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 2 - 74LS04 @ U79,82
____ 1 - 74LS05 @ U81
____ 2 - 74LS08 @ U69,74
____ 2 - 74LS32 @ U63,73
____ 1 - 74LS74 @ U64
____ 1 - 74LS90 @ U80
____ 2 - 74LS125 @ U65,71
____ 1 - 74LS138 @ U70
____ 1 - 74LS174 @ U89
____ 1 - 74LS240 @ U76
____ 2 - 74LS244 @ U77,88
____ 2 - 74LS245 @ U83,84
____ 1 - 74LS374 @ U78

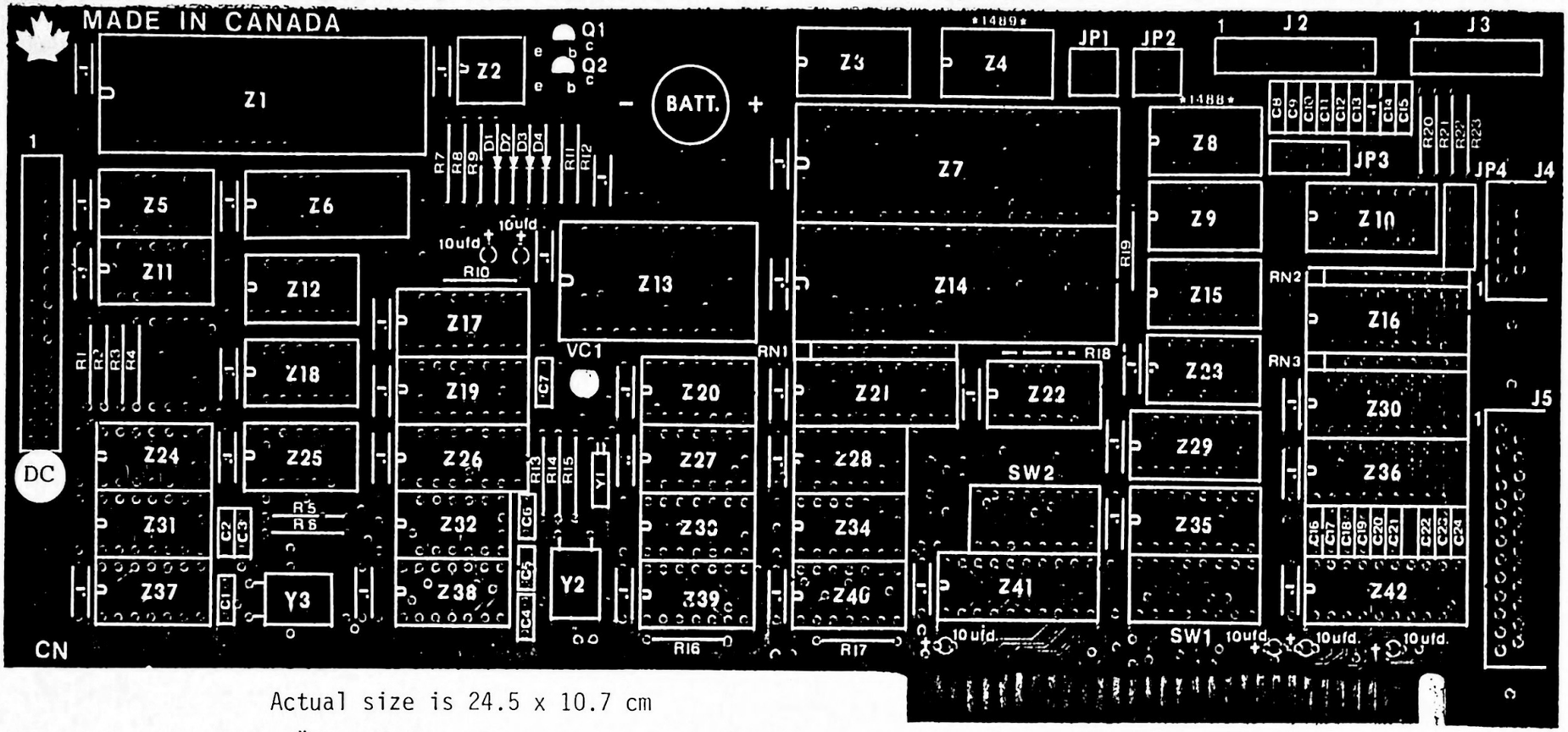
____ 2 - 74S08 @ U57,58
____ 1 - 74S32 @ U62
____ 2 - 74S138 @ U55,56
____ 2 - 74S157 @ U66,67
____ 1 - 74S280 @ U68

____ 1 - NE558 @ U90
____ 1 - MC1488 @ U87
____ 2 - MC1489 @ U85,86
____ 1 - 8250 @ U75
____ 1 - MM58167A @ U59
____ 1 - 24S10 PROM @ U72
____ 1 - 24S41 PROM @ U60
____54 - 4164 RAM 200 ns @ U1-54

DELAY LINE

____ 1 - 100 ns @ U61

MULTI I/O: Provides data I/O expansion including: 5¼" diskette adapter; parallel printer port; two RS232C asynchronous serial ports; game adapter port; real-time/clock-calendar with battery backup. Requires firmware (one PAL) and software (one diskette). Documentation available from supplier.



Actual size is 24.5 x 10.7 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

DIODES D *Position banded end (cathode) of diodes towards the arrow

____ 4 - 1N914 @ D1,2,3,4

RESISTORS R ¼ watt, 5%

____ 5 - 150 Ω @ R1,2,3,4,13
____ 2 - 1 KΩ @ R14,15
____ 5 - 2.2 KΩ @ R5,20,21,22,23
____ 7 - 4.7 KΩ @ R6,10,11,16,17,18,19
____ 1 - 10 KΩ @ R9

RESISTORS (continued)

____ 3 - 33 KΩ @ R7,8,12
____ 3 - 4.7 KΩ 10-pin SIP* bussed @ RN1,2,3 *Match pin 1 of SIP with pin 1 (square) on layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes before soldering

SOCKETS (continued)

____ 1 - 8-pin
____ 24 - 14-pin
____ 6 - 16-pin
____ 7 - 20-pin
____ 1 - 24-pin
____ 3 - 40-pin

MULTI I/O (continued)

CAPACITORS C

____ 1 - 18 pF @ C7
____ 1 - 22 pF @ C1
____ 5 - 47 pF @ C6,8,9,10,11
____ 1 - 100 pF @ C4
____ 1 - 330 pF @ C2
____ 1 - 470 pF @ C3
____ 9 - 0.002 µF @ C16,17,18,19,20, C21,22,23,24
____ 5 - 0.01 µF @ C5,12,13,14,15
____ 31 - 0.1 µF Monolithic @ .1
____ 6 - 10 µF/16V Tantalum* @ 10 ufd. *Match + of Tantalum with + on layout
____ 1 - 5-50 pF Trimcap @ VC1

CRYSTALS Y *Fold crystals flat against the card before soldering. Solder the case of Y2,3 to the grounding pads

____ 1 - 32.768 KHz @ Y1
____ 1 - 8.000 MHz @ Y2
____ 1 - 18.432 MHz @ Y3

TRANSISTORS Q *Match ebc transistor leads with ebc on the layout

____ 1 - 2N3906 @ Q1
____ 1 - 2N3904 @ Q2

BATTERY *Match + of battery with + on the layout

____ 1 - 3.0 V Li @ BATT.

SWITCH

____ 2 - 8-position DIP
@ SW1 - IRQ enable
@ SW2 - I/O port configur

HEADERS male, straight

____ 1 - 2x17 @ DC: disk controller
____ 1 - 2x10 @ J2: 2nd serial
____ 1 - 2x8 @ J3: game port

HEADERS (continued)

____ 2 - 3x3 @ JP1: 2nd serial jumpers
@ JP2: 1st serial jumpers
____ 2 - 2x5 @ JP3: 2nd serial jumpers
@ JP4: 1st serial jumpers

CONNECTORS

____ 1 - DE9P @ J4: 1st serial port
____ 1 - DB25S @ J5: parallel printer port
____ - - jumper pins
____ - - appropriate cables

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout. ICs labelled † for 2nd serial port

____ 1 - 74LS00 @ Z32
____ 1 - 74LS02 @ Z24
____ 3 - 74LS04 @ Z25,31,38
____ 1 - 74LS05 @ Z23
____ 1 - 74LS08 @ Z12
____ 1 - 74LS11 @ Z34
____ 2 - 74LS32 @ Z20,39
____ 1 - 74LS86 @ Z27
____ 1 - 74LS90 @ Z33
____ 1 - 74LS93 @ Z37

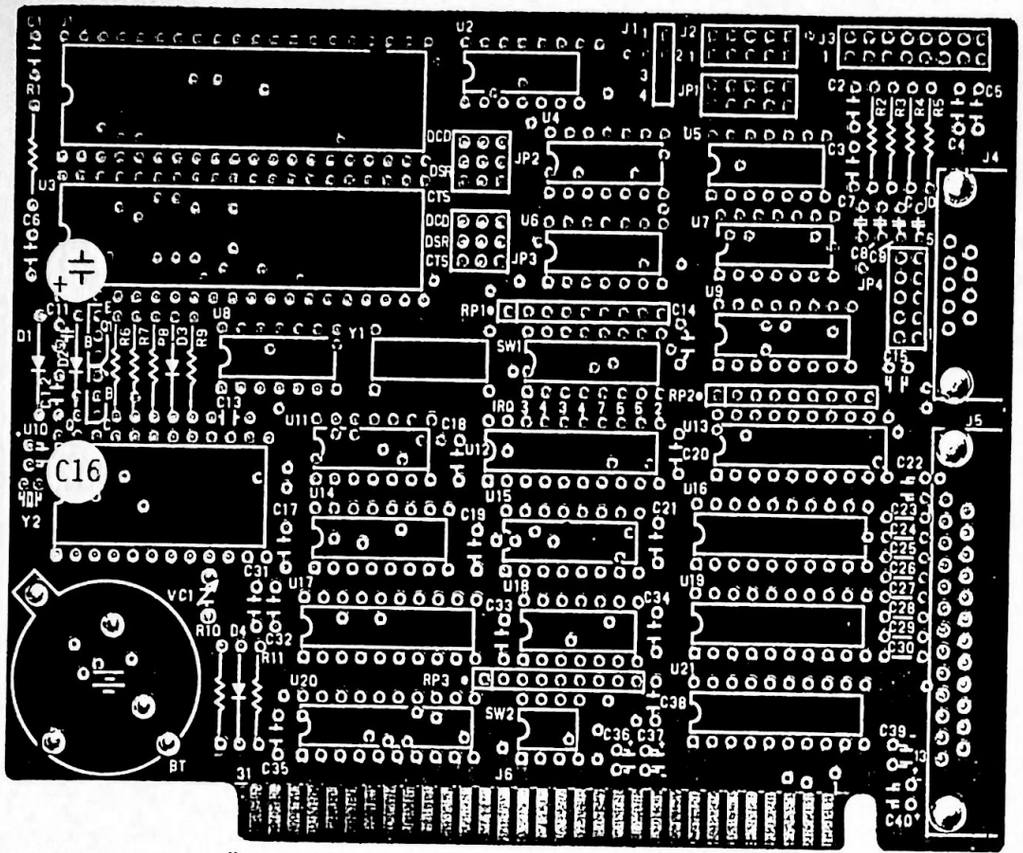
____ 1 - 74LS109 @ Z26
____ 4 - 74LS125 @ Z18,22,28,40
____ 3 - 74LS138 @ Z5,11,35
____ 1 - 74LS174 @ Z29
____ 1 - 74LS175 @ Z17
____ 1 - 74LS195 @ Z19
____ 3 - 74LS244 @ Z16,21,30
____ 1 - 74LS245 @ Z42
____ 1 - 74LS273 @ Z6
____ 1 - 74LS374 @ Z36

____ 1 - NE558 @ Z10
____ 1 - µPD765 @ Z1
____ 3 - MC1488 @ Z8†,9,15
____ 2 - MC1489 @ Z3,4†

INTEGRATED CIRCUITS (continued)

____ 1 - MM58167AN @ Z13
____ 2 - INS8250 @ Z7†,14
____ 1 - WD9216 @ Z2
____ 1 - PAL16L8 @ Z41

PERFECT MULTI I/O: Multi-layer short-slot card provides data I/O expansion including: parallel printer port; two asynchronous serial ports; game adapter port; real-time/clock-calendar with battery back-up. Requires firmware (two PROMs) and software (one diskette). Documentation available from supplier.



Actual size is 13.3 x 10.8 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

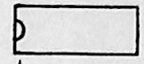
DIODES D *Position banded end (cathode) of diodes towards the arrow
____ 4 1N914 @ D1,2,3,4

RESISTORS R ¼ watt, 5%
____ 4 - 2.2 KΩ @ R2,3,4,5
____ 1 - 4.7 KΩ @ R8
____ 2 - 10 KΩ @ R1,9
____ 3 - 33 KΩ @ R6,7,10
____ 1 - 150 KΩ @ R11

RESISTORS (continued)
____ 3 - 4.7 KΩ 10-pin SIP* bussed @ RN1,2,3 *Match pin 1 of SIP with pin 1 (dot) on layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes before soldering
____ 8 - 14-pin
____ 3 - 16-pin

SOCKETS (continued)
____ 7 - 20-pin
____ 1 - 24-pin
____ 2 - 40-pin



CAPACITORS C *C21,33 are not equipped
____ 1 - 22 pF @ C31
____ 4 - 47 pF @ C2,3,4,5
____ 4 - 0.01 µF @ C7,8,9,10
____ 9 - 0.002 µF @ C22,23,24,25,26,27,28, C29,30
____14 - 0.1 µF Monolithic @ C1,6,12,13,14, @ C15,17,18,19,20,32,34 @ C35,38
____ 6 - 10 µF/16V Tantalum* @ C11,16,36, @ C37,39,40 *Match + with + on the layout
____ 1 - 5-50 pF Trimcap @ VC1

CRYSTAL Y *Fold Y2 flat against the card before soldering
____ 1 - 32.768 KHZ @ Y2
____ 1 - 18.432 MHz oscillator* @ Y1 *Match pin 1 of Y1 with pin 1 (square pad) on the layout

TRANSISTORS Q *Match EBC transistor leads with EBC on the layout
____ 1 - 2N2222A @ Q
____ 1 - 2N2907A @ Q1

BATTERY *Match + of battery with + on the layout
____ 1 - 3.0 V Li @ BT

SWITCH
____ 1 - 4-position DIP @ SW2 I/O port configuration
____ 1 - 8-position DIP @ SW1 IRQ enable

PERFECT MULTI I/O (continued)

HEADERS male, straight

____ 1 - 2x5 @ JP1: 2nd serial jumpers
____ 2 - 3x3 @ JP2: 2nd serial jumpers
         @ JP3: 1st serial jumpers
____ 1 - 1x4 @ J1 : external battery
____ 1 - 2x5 @ J2 : 2nd serial connector
____ 1 - 2x8 @ J3 : game port

CONNECTORS

____ 1 - DE9P @ J4: 1st serial port
____ 1 - DB25S @ J5: parallel port
____ - - jumper pins
____ 2 - appropriate cables
____ 1 - rear panel adapter

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout. ICs labelled † are optional for 2nd serial port

____ 1 - 74LS04 @ U11
____ 1 - 74LS05 @ U18
____ 1 - 74LS125 @ U8
____ 1 - 74LS138 @ U15
____ 1 - 75LS174 @ U14
____ 3 - 74LS244 @ U13,16,17
____ 1 - 74LS245 @ U21
____ 1 - 74LS374 @ U19

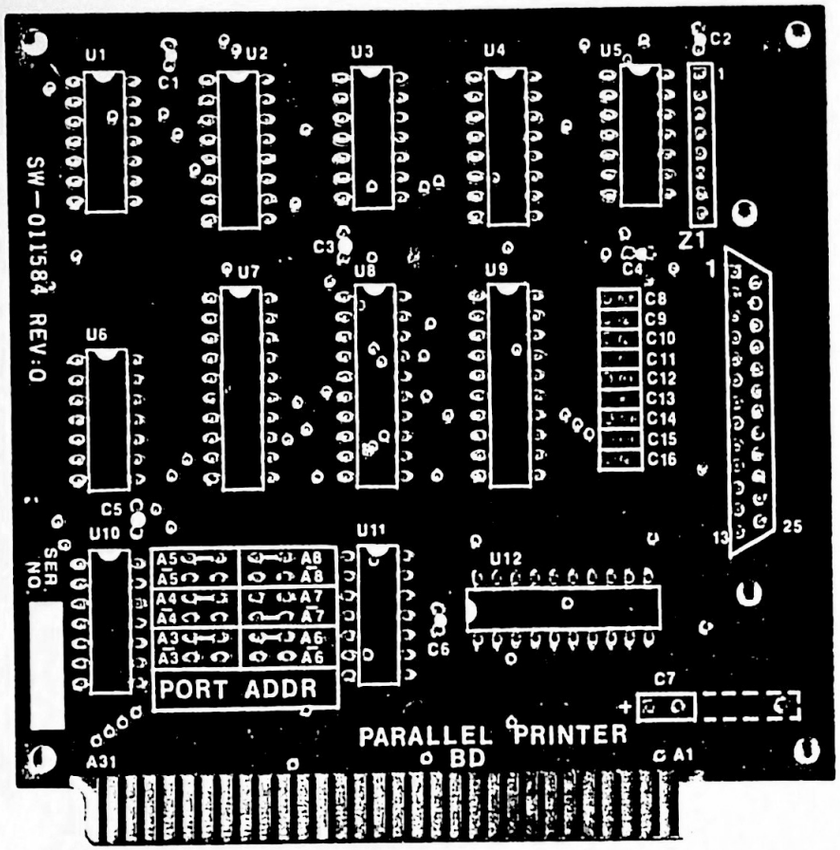
____ 1 - NE558 @ U9
____ 2 - 1488 @ U2†,7
____ 3 - 1489 @ U4†,5,6
____ 1 - MM58167A @ U10
____ 1 - INS8250 @ U1†,3
____ 1 - PROM @ U12,20

NuScope Associates

NuScope Associates

PARALLEL PRINTER CARD: Allows interface to parallel printers. With power off, install in any free slot. Card will fit in "short slot". Schematics available from supplier.

Actual size is
10.9 x 10.6 cm



CONNECTORS

____ 1 - DB25S, 25-pin female, 90°, PCB mount, @ J1
____ 1 - rear panel adapter

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 2 - 74LS04 @ U6,11
____ 1 - 74LS05 @ U5
____ 1 - 74LS30 @ U10
____ 1 - 74LS32 @ U1
____ 1 - 74LS125 @ U3
____ 1 - 74LS139 @ U2
____ 1 - 74LS174 @ U4
____ 1 - 74LS240 @ U7
____ 1 - 74LS244 @ U8
____ 1 - 74LS245 @ U12
____ 1 - 74LS374 @ U9

pin 1 ➤

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

____ 1 - 4,7 KΩ 8-pin SIP* @ Z1
*Match pin 1 of SIP with pin 1 on the layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

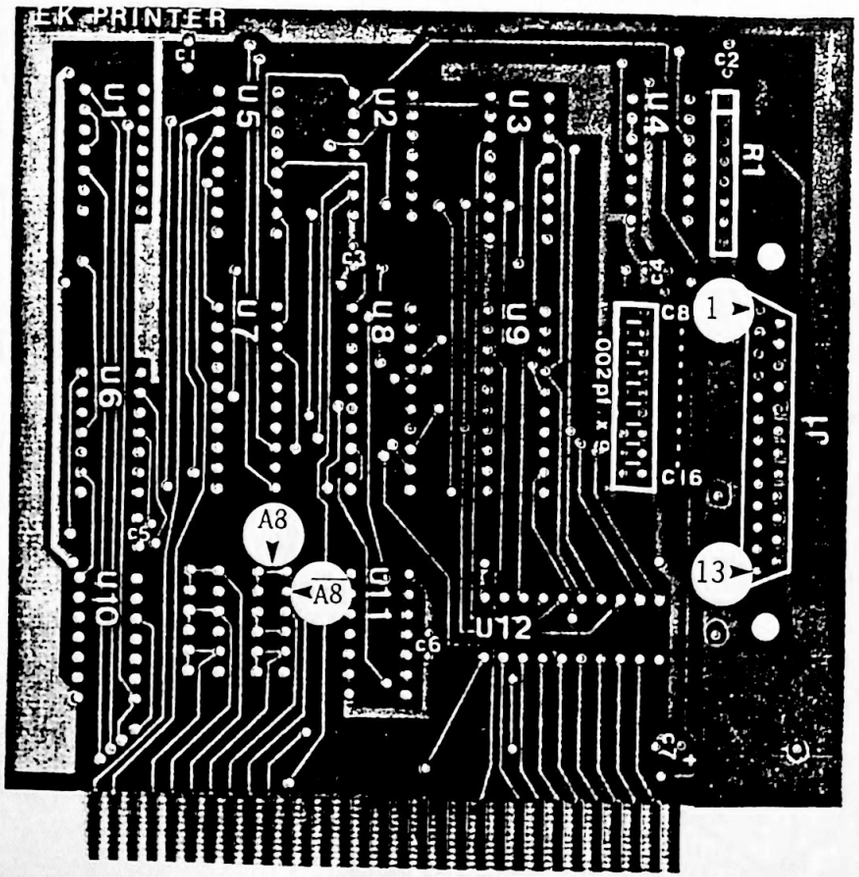
____ 6 - 14-pin
____ 2 - 16-pin
____ 4 - 20=pin

CAPACITORS C

____ 9 - 0.001 µF @ C8,9,10,11,12,13, C14,15,16
____ 6 - 0.1 µF Monolithic @ C1,2,3, C4,5,6
____ 1 - 4.7 µF/16V Tantalum* @ C7
*Match + of Tantalum with + on the layout

GUIDE 6-1 B

EK PRINTER CARD: Features an interface for one Centronics parallel printer. Card will fit in short slot. Schematics available from supplier.



Actual size is
11.0 cm x 10.9 cm

SUGGESTED SEQUINCE *INDICATES A PRECATION

RESISTORS R ¼ watt, 5%

____ 1 - 2.2 KΩ 8-pin SIP* @ R1 *Match pin 1 of SIP with the square on the layout

SOCKETS *Match pin 1 of sockets with pin 1 (@ base of U) on the layout. Check that ALL pins have passed thru ALL holes

SOCKETS (continued)

____ 6 - 14-pin
____ 2 - 16-pin
____ 4 - 20-pin

pin 1 ▶ Ux

CAPACITORS C

____ 9 - 0.001 µF @ C8,9,10,11,12 C13,14,15,16

____ 6 - 0.1 µF Monolithic @ C1, C2,3,4,5,6,

CAPACITORS (continued)

____ 1 - 33 µF/16V Tantalum* @ C7 *Match + of tantalum with + on layout

CONNECTORS

____ 1 - DB25S 25-pin female 90° @ J1
____ 1 - rear panel bracket

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 2 - 74LS04 @ U6,11
____ 1 - 74LS05 @ U4
____ 1 - 74LS30 @ U10
____ 1 - 74LS32 @ U1
____ 1 - 74LS125 @ U2
____ 1 - 74LS139 @ U5
____ 1 - 74LS174 @ U3
____ 1 - 74LS240 @ U7
____ 1 - 74LS244 @ U8
____ 1 - 74LS245 @ U12
____ 1 - 74S374 @ U9

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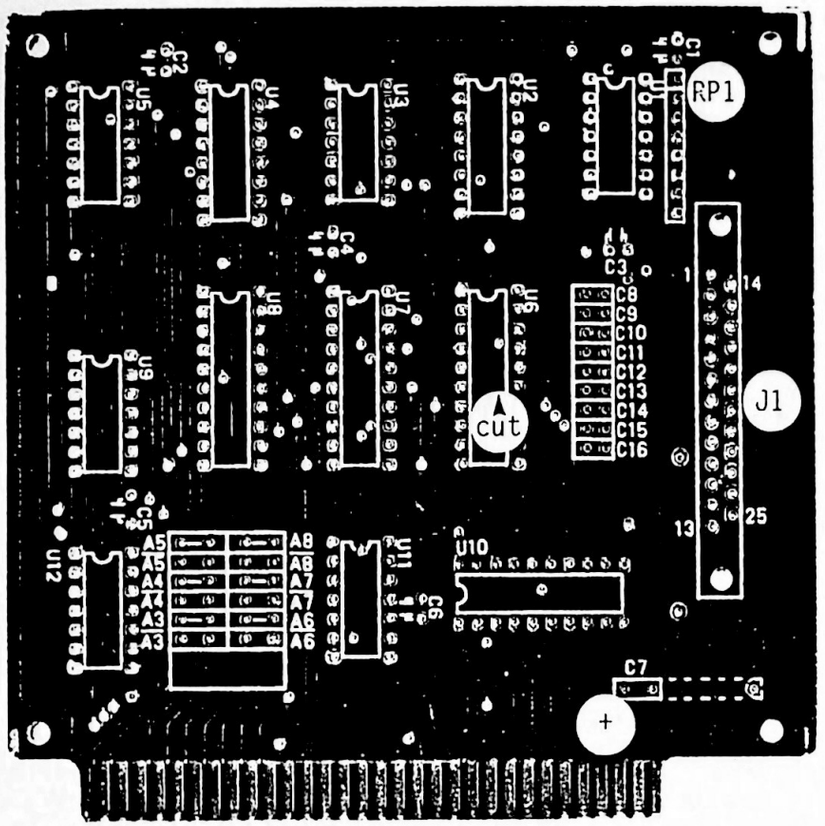
MPY PARALLEL PRINTER CARD: Features one parallel printer port. Card fits in short slot. Schematics available from supplier.

Actual size is
11.2 x 10.9 cm



CAPACITORS (continued)
____ 1 - 4.7 F/16V Tantalum* @ C7
*Match + of Tantalum with + on the layout

CONNECTORS
____ 1 - DB25S 25-pin female, 90° @ J1
____ 1 - rear panel bracket

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout
____ 2 - 74LS04 @ U9,11
____ 1 - 74LS05 @ U1
____ 1 - 74LS30 @ U12
____ 1 - 74LS32 @ U5
____ 1 - 74LS125 @ U3
____ 1 - 74LS139 @ U4
____ 1 - 74LS174 @ U2
____ 1 - 74LS240 @ U8
____ 1 - 74LS244 @ U7
____ 1 - 74LS245 @ U10
____ 1 - 74LS374 @ U6

SUGGESTED SEQUENCE *INDICATES A PRECAUTION *MODIFICATION REQUIRED

*MODIFICATION: Cut trace from pin 15 of U6 as shown on the layout

RESISTORS R ¼ watt, 5%
____ 1 - 4.7 KΩ 8-pin SIP* bussed @ RP1
*Match pin 1 of SIP with pin 1 (square) on the layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

SOCKETS (continued)
____ 6 - 14-pin
____ 2 - 16-pin
____ 4 - 20-pin

pin 1 ➤

CAPACITORS C
____ 9 - 0.001 µF @ C
____ 6 - 0.1 µF Monolithic @ C1,2,3, C4,5,6

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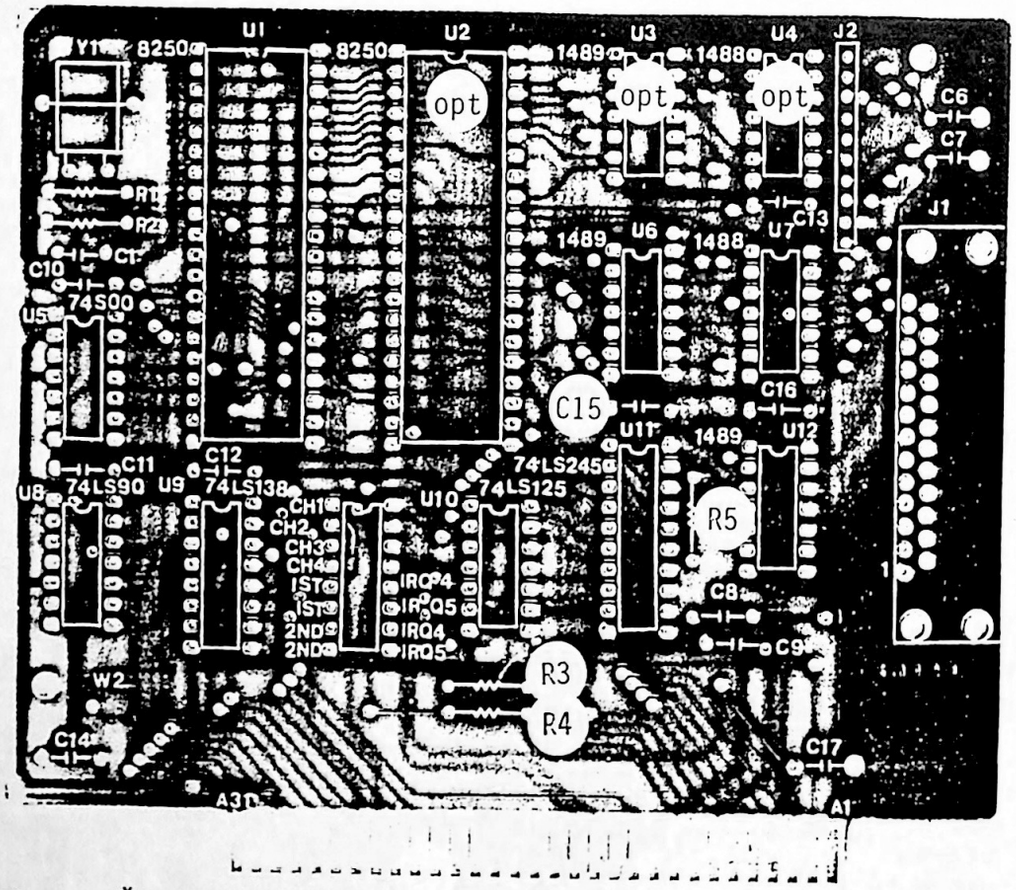
MPY SERIAL CARD: Offers two RS-232C asynchronous serial ports with programmable baud rate generator for operation from 50 to 9600 baud. Supports five, six, seven, or eight bit characters with 1, 1½, or 2 stop bits. Interupt system controls transmit, receive, error, line status, & data set interupts. Documentation & schematics are available from supplier.

Actual size is
12.8 x 10.8 cm



CRYSTAL *Fold crystal flat against the card before soldering. Solder the case to the card

____ 1 - 18.432 MHz @ Y1

CONNECTORS

____ 1 - 1x10 header, male, straight @ J2
____ 1 - DB25P male, 90°, PCB mount @ J1

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout. ICs labelled opt are for the optional second port

____ 1 - 74LS00 @ U5
____ 1 - 74LS90 @ U8
____ 1 - 74LS125 @ U10
____ 1 - 74LS138 @ U9
____ 1 - 74LS245 @ U11
____ 2 - 1488 @ U4,7
____ 3 - 1489 @ U3,6,12
____ 2 - 8250 @ U1,2

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESSITORS R ¼ watt, 5%

____ 2 - 470 Ω @ R1,2
____ 3 - 3.3 KΩ @ R3,4,5

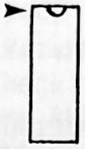
SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 8 - 14-pin
____ 1 - 16-pin

SOCKETS (continued)

____ 1 - 20-pin
____ 2 - 40-pin

pin 1 ➤



CAPACITORS C

____ 3 - 47 pF @ C1,6,7
____ 10 - 0.1 µF @ C8,9,10,11,12,13 C14,15,16,17

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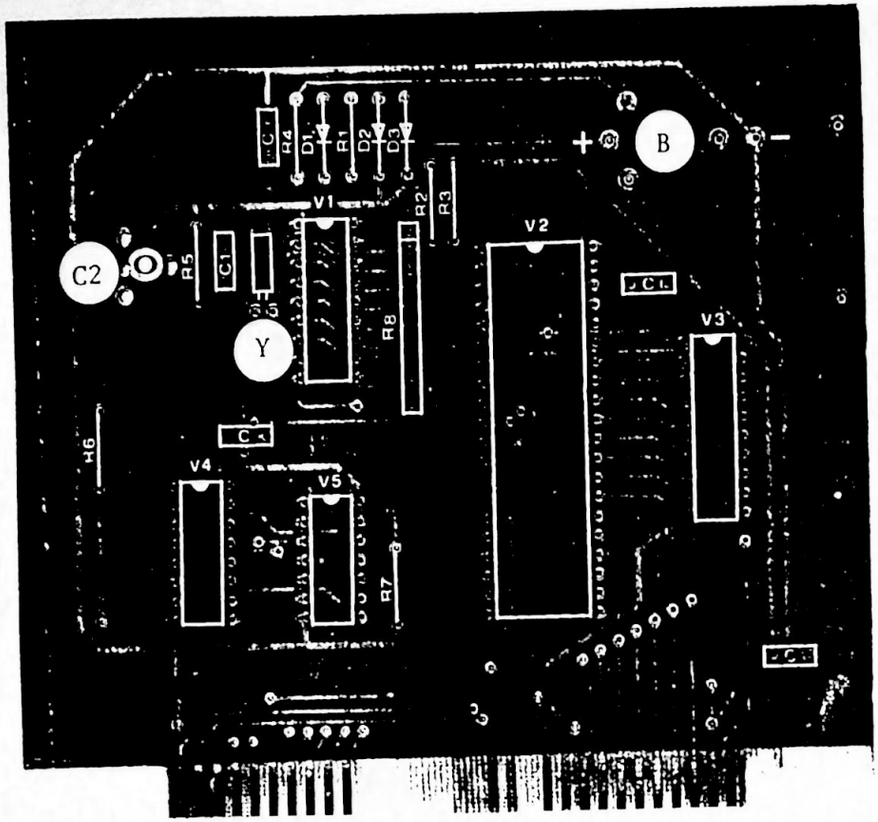
PRELUDE CLOCK CARD: Add real-time/clock-calender with battery back-up. Fits in "short slot". Requires software (one diskette). Documentation available from supplier.



Actual size is 11.5 x 10.5 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

DIODES D *Position banded end (cathode) of diode towards the arrow

____ 3 - IN4148 @ D1,2,3

RESISTORS R ¼ watt, 5%

____ 2 - 330 Ω @ R1,4
____ 1 - 1 KΩ @ R7
____ 4 - 3.3 KΩ @ R2,3,5,6
____ 1 - 3.3 KΩ 10-pin SIP*, bussed, @ R8
*Match pin 1 of SIP with pin 1 (square) on the layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout
Check that ALL pins have passed thru ALL holes

____ 1 - 14-pin
____ 1 - 16-pin
____ 1 - 18-pin
____ 1 - 20-pin
____ 1 - 40-pin

pin 1 ➤

CAPACITORS C

____ 1 - 22 pF @ C1
____ 4 - 0.1 µF Monolithic @ C
____ 1 - 10-50 pF Trimcap @ C2

CRYSTAL C Fold crystal flat against the card before soldering

____ 1 - 32.768 KHz @ Y

BATTERY *Match + of battery with + on the layout

____ 1 - 3.0 V Lithium @ B

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS138 @ V4
____ 1 - 74LS245 @ V3
____ 1 - 74ALS32 @ V5
____ 1 - MSM5832RS @ V1
____ 1 - 8255A-5 @ V2

*MODIFICATION REQUIRED ON THE SOLDER SIDE:
Strap pin 20 of V3 to pin 26 of V2

6-3 pg 1

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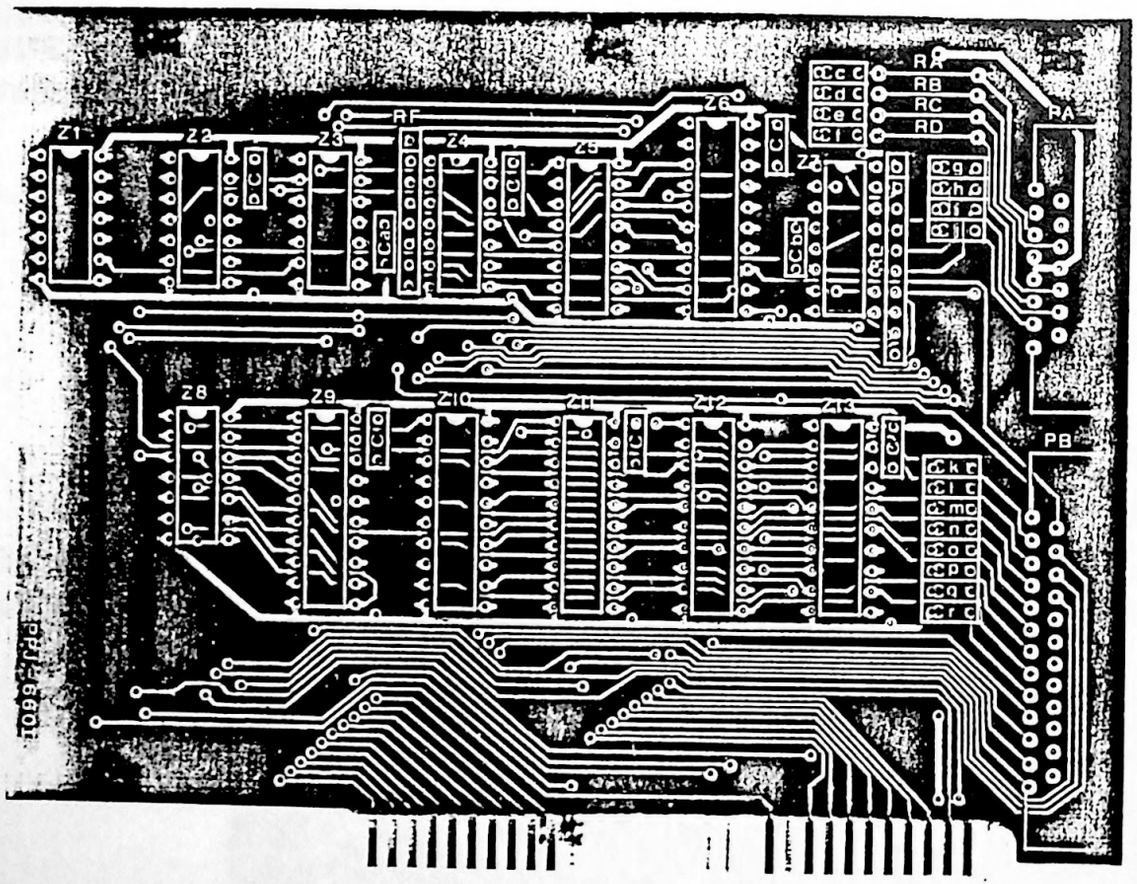
PRELUDE PARALLEL/GAME ADAPTER: Provides one Centronics parallel printer port and one game ports (for up to four paddles or two joysticks). Requires firmware (one PAL). Documentaion available from supplier.



Actual size is 14.4 cm x 10.7 cm

CAPACITORS C

____ 4 - 50 pF @ Cg,h,i,j
____ 9 - 0.0022 µF @ Ca,k,l,m,n,o,p,q,r
____ 5 - 0.01 µF @ Cb,c,d,e,f
____ 6 - 0.1 µF Monolithic @ "c"

CONNECTORS

____ 1 - DA15S female, 90° @ PA (game)
____ 1 - DB25S female, 90° @ PB (parallel)
____ 1 - rear panel bracket

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS02 @ Z1
____ 1 - 74LS04 @ Z3
____ 1 - 74LS05 @ Z4
____ 1 - 74LS32 @ Z8
____ 1 - 74LS125 @ Z2
____ 1 - 74LS174 @ Z5
____ 1 - 74LS240 @ Z6
____ 2 - 74LS244 @ Z10,12
____ 1 - 74LS245 @ Z11
____ 1 - 74LS374 @ Z13
____ 1 - NE558 @ Z7
____ 1 - PAL16L8 @ Z9

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

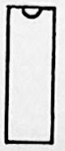
RESISTORS R ¼ watt, 5%

____ 4 - 2.0 KΩ @ RA,B,C,D
____ 1 - 2.2 KΩ 8-pin SIP* bussed @ RF
____ 1 - 4.7 KΩ 10-pin SIP* bussed @ RE
*Match pin 1 of SIPs with pin 1 (square) on the layout

SOCKETS *Match pin 1 of sockets with pin 1 on tne layout. Check that ALL pins have passed thru ALL holes

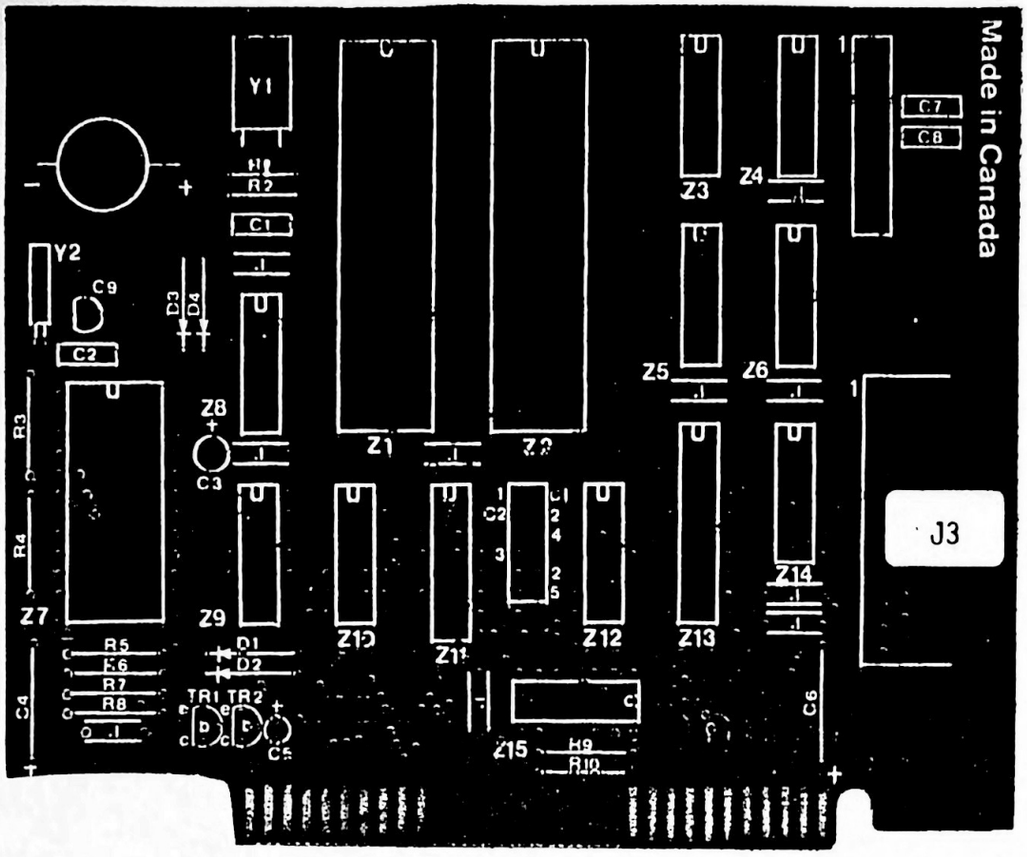
____ 5 - 14-pin
____ 2 - 16-pin
____ 6 - 20-pin

pin 1 ➤



PRELUDE SERIAL/CLOCK: Includes two asynchronous serial ports and a battery-backed clock/calendar. Requires software (one diskette) and firmware (one PROM).

Actual size is
13.5 x 10.8 cm



SUGGESTED SEQUENCE *INDICATES A PRECAUTION

DIODES D *Position banded (cathode) end of diode towards the arrow
____ 4 - 1N4148

RESISTORS R ¼ watt, 5%
____ 2 - 470 Ω @ R1,2
____ 3 - 4.7 KΩ @ R5,9,10
____ 1 - 12 KΩ @ R4
____ 3 - 33 KΩ @ R6,7,8
____ 1 - 100 KΩ @ R3

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes
____10 - 14-pin
____ 1 - 16-pin
____ 1 - 20-pin
____ 1 - 24-pin
____ 2 - 40-pin

CAPACITORS C
____ 1 - 22 pF @ C2
____ 3 - 470 pF @ C1,7,8
____10 - 0.1 µF Monolithic @ .1
____ 1 - 5 to 50 pF Trimcap @ C9
*Match + of the following electrolytic caps with + on the layout
____ 2 - 3.3 µF/16V Axial* @ C4,6
____ 2 - 10 µF/16V Tantalum C3,5

TRANSISTORS Q *Match EBC transistor leads as shown
____ 1 - 2N3904 @ TR1
____ 1 - 2N3906 @ TR2

CRYSTALS *Fold crystals flat against the card before soldering
____ 1 - 32.768 KHz @ Y2
____ 1 - 18.432 MHz @ Y1

BATTERY *Match + of battery with + on the layout
____ 1 - 3V Lithium

HEADERS male, straight
____ 1 - 2x6 @ J1
____ 1 - 2x10 @ J2

CONNECTORS
____ 1 - DB25S female @ J3
____ 1 - rear panel bracket
____ - - jumper plugs

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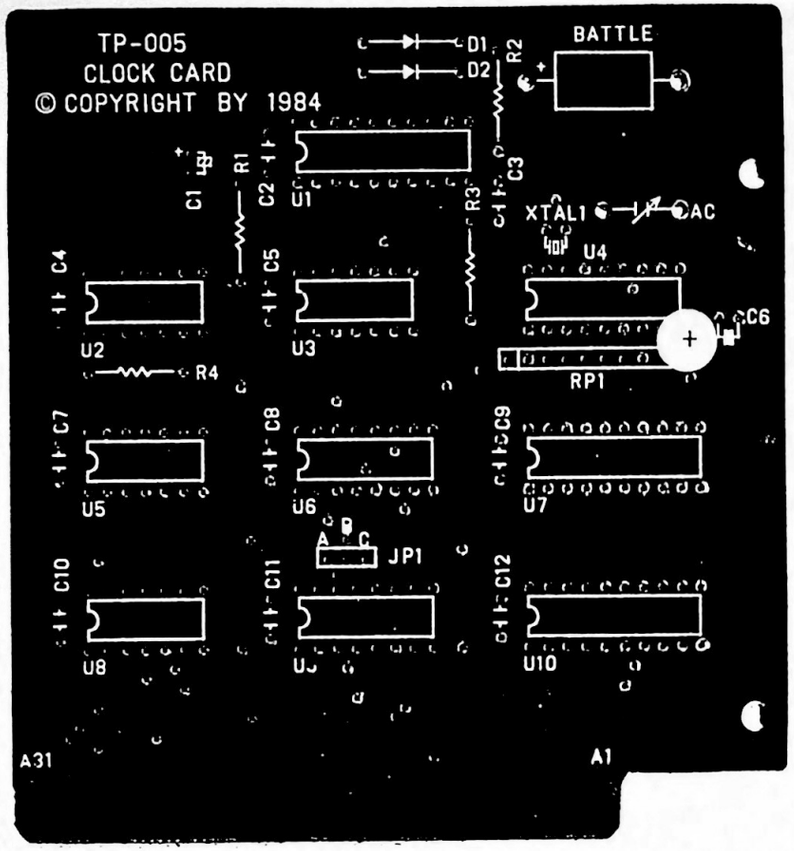
PRELUDE SERIAL/CLOCK (continued)

INTEGRATED CIRCUITS *Match pin 1 of
ICs with pin 1 on the layout

____ 1 - 74LS04 @ Z8
____ 1 - 74LS21 @ Z15
____ 1 - 74LS32 @ Z10
____ 1 - 74LS90 @ Z9
____ 1 - 74LS245 @ Z13
____ 1 - 74125 @ Z12
____ 2 - MC1488 @ Z6 (Z4 optional)
____ 3 - MC1489 @ Z5,14 (Z3 optional)
____ 2 - INS8250 @ Z2 (Z1 optional)
____ 1 - MM58167AN @ Z7
____ 1 - 82S129 PROM @ Z11
____

TP CLOCK/CALENDAR: Features real-time/clock calendar with battery back-up. Fits in short slot. Requires software (one diskette).



Actual size is 10.3 x 10.7 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

DIODES D *Position banded end (cathode) of diode towards the arrow

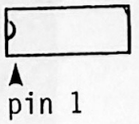
____ 2 - 1N914 @ D1,2

RESISTORS R ¼ watt, 5%

____ 1 - 120 Ω @ R2
____ 1 - 470 Ω @ R4
____ 2 - 2.2 KΩ @ R1,3
____ 1 - 1 KΩ 9-pin SIP*, bussed @ RP1
*Match pin 1 of SIP with pin 1 (square) on the layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes before soldering

____ 4 - 14-pin
____ 2 - 16-pin
____ 1 - 18-pin
____ 3 - 20-pin



CAPACITORS C

____ 1 - 18 pF @ C3
____ 9 - 0.1 µF Monolithic @ C2,4,5,7,8,9, C10,11,12
____ 2 - 10 µF/16V Tantalum* @ C1,6
*Match + of Tantalum with + on the layout
____ 1 -5-50 pF Trimcap @ AC

HEADER

____ 1 - 1x3 male, straight @ JP1

BATTERY *Match + of battery with + on layout

____ 1 - 3.6 V NiCad @ BATTLE

CRYSTAL Y

____ 1 - 32.768 KHz @ XTAL1

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS04 @ U5
____ 1 - 74LS08 @ U2
____ 1 - 74LS20 @ U8
____ 1 - 74LS125 @ U3
____ 1 - 74LS138 @ U9
____ 1 - 74LS155 @ U6
____ 1 - 74LS245 @ U10
____ 1 - 74LS273 @ U7
____ 1 - 74LS374 @ U1
____ 1 - M5832 @ U4

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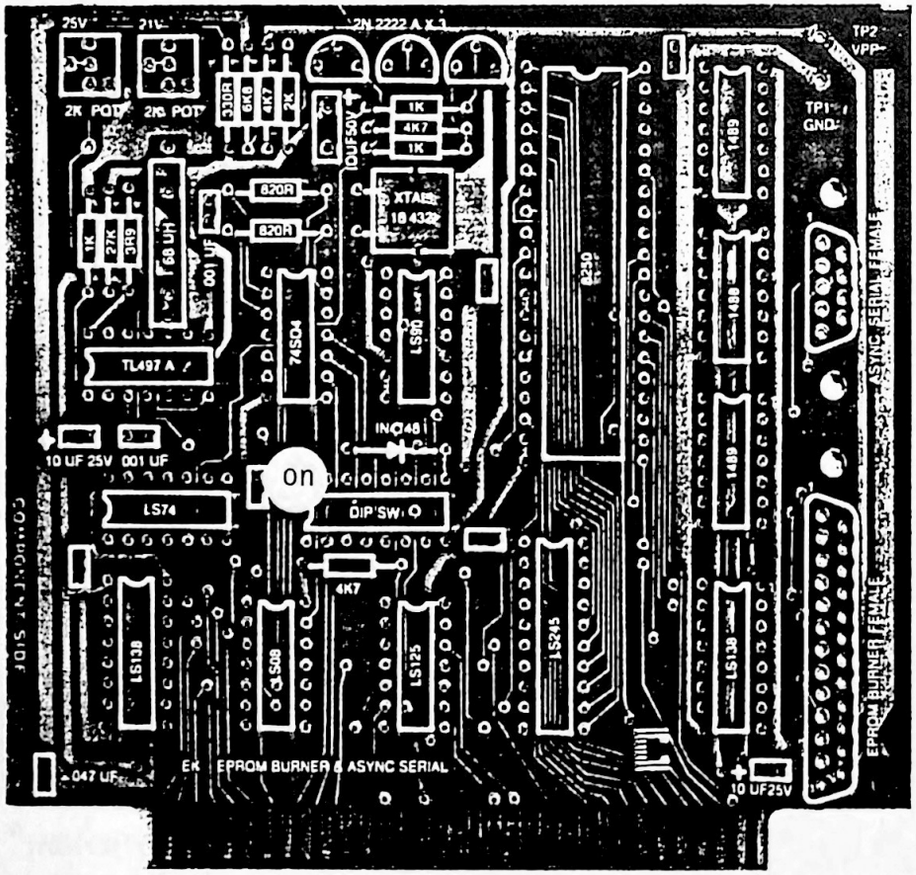
EK EPROM BURNER & ASYNCHRONOUS SERIAL CARD (two-card set): Consists of (i) RS-232-C serial port - operates from 110 to 9600 baud, and (ii) EPROM programmer that can burn 2716-32-32A-64-128 as well as TMS2508-16-32-64 EPROMs. With power off, install in any vacant slot. Requires software (one disk). Documentation available from supplier. *Will NOT program 2764A or 27128A.

INTERNAL CARD



Actual size is 11.6 x 10.6 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

INTERNAL CARD:

DIODES D *Position banded (cathode) end of diode as shown

____ 1 - 1N4148 ●→|● banded end

RESISTORS R ¼ watt, 5%

____ 1 - 3.9 Ω
____ 2 - 330 Ω
____ 3 - 820 Ω

RESISTORS (continued)

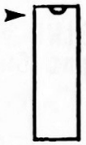
____ 1 - 1 KΩ
____ 1 - 2 KΩ
____ 3 - 4.7 KΩ
____ 1 - 6.8 KΩ
____ 1 - 27 KΩ
____ 2 - 2.2 KΩ trimpot

INDUCTOR L

____ 1 - 68 µH, ½ watt

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 9 - 14-pin
____ 2 - 16-pin
____ 1 - 20-pin
____ 1 - 40-pin

pin 1 ➤ 

CAPACITORS C

____ 2 - 0.001 µF
____ 5 - 0.047 µF (0.1 µF) @ ▭ Monolithic
____ 2 - 10 µF/25V Axial* *Match + of Axials with + on the layout
____ 1 - 10 µF/50V Axial*

TRANSISTORS Q *Position EBC terminals as shown on the layout

____ 3 - 2N2222A

SWITCH

____ 1 - 8-position DIP

CRYSTAL Y *Fold crystal flat against the card before soldering

____ 1 - 18.4320 MHz @ XTAL

CONNECTORS

____ 1 - DE9S female, 90°, PCB mount
____ 1 - DB25S female, 90°, PCB mount
____ 2 - header @ TP1,2
____ 1 - rear panel adapter

continued

EK EPROM BURNER & ASYNCHRONOUS SERIAL CARD (continued)

INTERNAL CARD (continued)

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

pin 1 ➤

____ 1 - 74LS08
____ 1 - 74LS74
____ 1 - 74LS90
____ 1 - 74LS125
____ 2 - 74LS138
____ 1 - 74LS245
____ 1 - 74S04
____ 1 - 1488
____ 2 - 1489
____ 1 - TL497A (T.I.)
____ 1 - 8250 (NAT)

PINOUT FOR DE9S SERIAL CONNECTOR:

pin #	function
1	ring indicator
2	receive data
3	transmit data
4	clear to send
5	request to send
6	data set ready
7	carrier detect
8	signal ground
9	data ready terminal

INTERNAL CARD SWITCH SETTINGS:

I: ASYNCHRONOUS COMMUNICATIONS:

switch	1	2	3	4
com 1	off	on	off	on
com 2	off	on	on	off
aux	on	off	off	on
mice	on	off	on	off

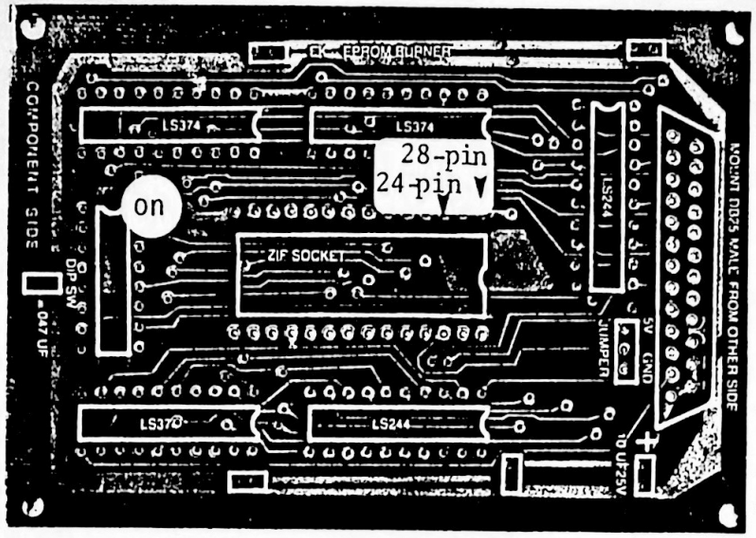
II: EXTERNAL EPROM BURNER:

switch	5	6	7	8
+25V VPP	off	on	off	-
+21V VPP	off	off	on	-

pull VPP up to +5V ..... on
pull VPP down to ground ... off

CALIBRATION OF EPROM PROGRAMMER VPP VOLTAGES:**

Before using the EPROM burner, adjust the VPP voltages. Select "calibrate" from software menu. Adjust the two trimpots using TP1 GND and TP2 VPP. NB: Lower justify all 24-pin EPROMs in the 28-pin ZIF socket.
*To program 24-pin 2716 & 2732 jumper 5V; for 28-pin 2764 & 27128 jumper GND



EXTERNAL CARD Actual size is 9.9 x 6.7 cm

EXTERNAL CARD:

SOCKETS
____ 5 - 20-pin
____ 1 - 28-pin ZIF

CAPACITORS
____ 4 - 0.047 µF Monolithic
____ 1 - 10 µF/25V Axial*

SWITCH
____ 1 - 8-position DIP

CONNECTORS
____ 1 - DB25P, male, 90°
*Mount on SOLDER side
____ 1 - 1x3 header, male, straight
____ 1 - jumper plug

INTEGRATED CIRCUITS
____ 2 - 74LS244
____ 3 - 74LS374

MOUNT EXTERNAL CARD with four standoffs on an appropriate base leaving sufficient space for access to DB25 connector. Connect the EXTERNAL CARD to the INTERNAL CARD by means of a ribbon cable of appropriate length.

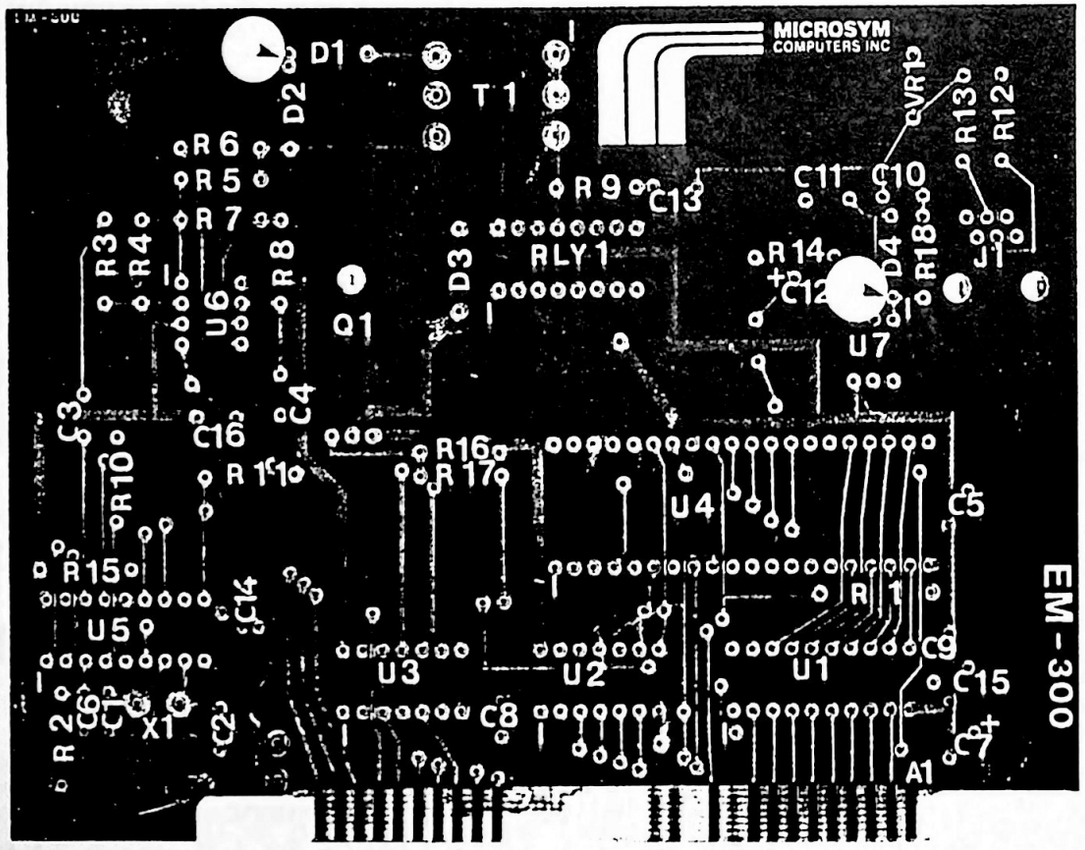
SWITCH SETTINGS FOR EPROM BURNER: *Will NOT program 2764A or 27128A EPROMs

	external card switch settings								internal card switch settings		
EPROM type	1	2	3	4	5	6	7	8	6	7	8
2716	off	on	off	on	off	off	off	off	on	off	on
2732	on	off	on	off	off	off	off	off	on	off	off
2732A	on	off	on	off	off	off	off	off	off	on	off
2764	on	off	off	off	on	on	off	off	off	on	on
27128	on	off	off	off	on	on	off	off	off	on	on
TMS2508	off	on	off	on	off	off	off	off	on	off	on
TMS2516	off	on	off	on	off	off	off	off	on	off	on
TMS2532	off	on	off	on	off	off	off	off	on	off	on
TMS2564	on	off	off	on	off	off	on	off	on	off	on

*Check EPROM specifications for chip enable and pull up to + 5V or pull down to ground. Set jumper on External Card accordingly.

EM-300 MODEM: Answer/originate modem operating on a 2-line telephone line at 300 baud in optional half or full duplex. Requires DOS 2.0; 64K RAM memory minimum; 80-column display; software (one disk). With power off and COMPONENT SIDE FACING THE POWER SUPPLY, install in any slot. Documentation available from supplier.

Actual size is 13.8 x 10.4 cm



SUGGESTED SEQUENCE *INDICATES A PRECAUTION

DIODES D *Position banded end (cathode) towards the arrow on the layout

____ 2 - 1N751A @ D1,2
____ 1 - 1N4148 @ D3
____ 1 - 1N4001 @ D4

RESISTORS R ¼ watt, 5%

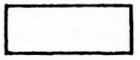
____ 2 - 1 Ω @ R12,13
____ 1 - 560 Ω @ R5
____ 1 - 1 KΩ @ R1
____ 1 - 2.2 KΩ @ R17

RESISTORS (continued)

____ 1 - 2.2 KΩ ½ watt* @ R18
____ 1 - 4.7 KΩ @ R9
____ 1 - 6.8 KΩ @ R4
____ 8 - 10 KΩ @ R3,6,7,8,10,11,14,15
____ 1 - 22 KΩ @ R16
____ 1 - 4.7 MΩ @ R2

SOCKETS *Match pin 1 of sockets with pin 1 (1) on the layout. Check that ALL pins have passed thru ALL holes

SOCKETS (continued)



____ 1 - 6-pin
____ 1 - 8-pin
____ 2 - 14-pin
____ 1 - 16-pin
____ 1 - 18-pin
____ 1 - 20-pin
____ 1 - 40-pin

CAPACITORS C

____ 2 - 15 pF @ C1,2
____ 1 - 0.001 µF @ C6
____ 2 - 0.01 µF @ C14,16
____ 9 - 0.1 µF Monolithic @ C3,4,5, C8,9,10,11,13,15

*Match + of the following with + on layout

____ 1 - 2.2 µF/35V Tantalum* @ C7
____ 1 - 4.7 µF/35V Tantalum* @ C12

TRANSISTOR Q *Position metal part of device flat against the card before soldering

____ 1 - TIP125 or TIP127 @ Q1

CRYSTAL Y *Fold crystal flat against the card before soldering

____ 1 - 4.032000 MHz @ X1

VARISTOR

____ 1 - V120ZA1 (GE) @ VR1

RELAY

____ 1 - G2V-2 5V (Omron) @ RLY 1

TRANSFORMER

____ 1 - 141H (Hammond) 600CT/600CT line matching @ T1

CONNECTORS

____ 1 - modular telephone jack, PCB 6-pin, PCB mount, @ J1

EM-300 MODEM (continued):

INTEGRATED CIRCUITS *Match pin 1 of ICs
with pin 1 on the layout

____ 1 - 74LS14 @ U3
____ 1 - 74LS30 @ U2
____ 1 - 74LS245 @ U1

____ 1 - 4N32   @ U7
____ 1 - MC1458 @ U6
____ 1 - TMS99532 (T.I.) @ U5 Modem IC
____ 1 - 2681A   (SIG.) @ U4 DUART 40-pin

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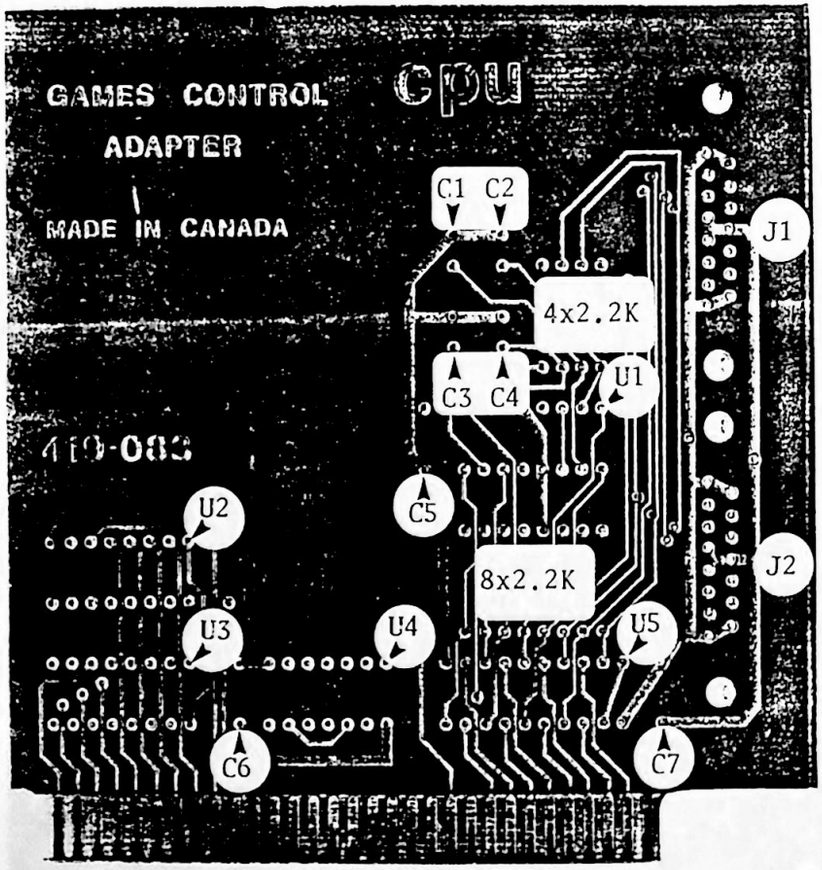
PRESTIGE GAMES CONTROL ADAPTER CARD: Interface for one or two joysticks. Fits in short slot.



Actual size is 10.6 cm x 10.8 cm

SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

____12 - 2.2 KΩ @ 2.2K

SOCKETS *Match pin 1 of sockets with pin 1 on the layout.
Check that ALL pins have passed thru ALL holes.
*Pin 1 is indicated by an arrow.

____ 1 - 14-pin
____ 3 - 16-pin
____ 1 - 20-pin

CAPACITORS C

____ 4 - 0.01 µF Mylar @ C1,2,3,4
____ 3 - 0.1 µF Monolithic @ C5,6,7

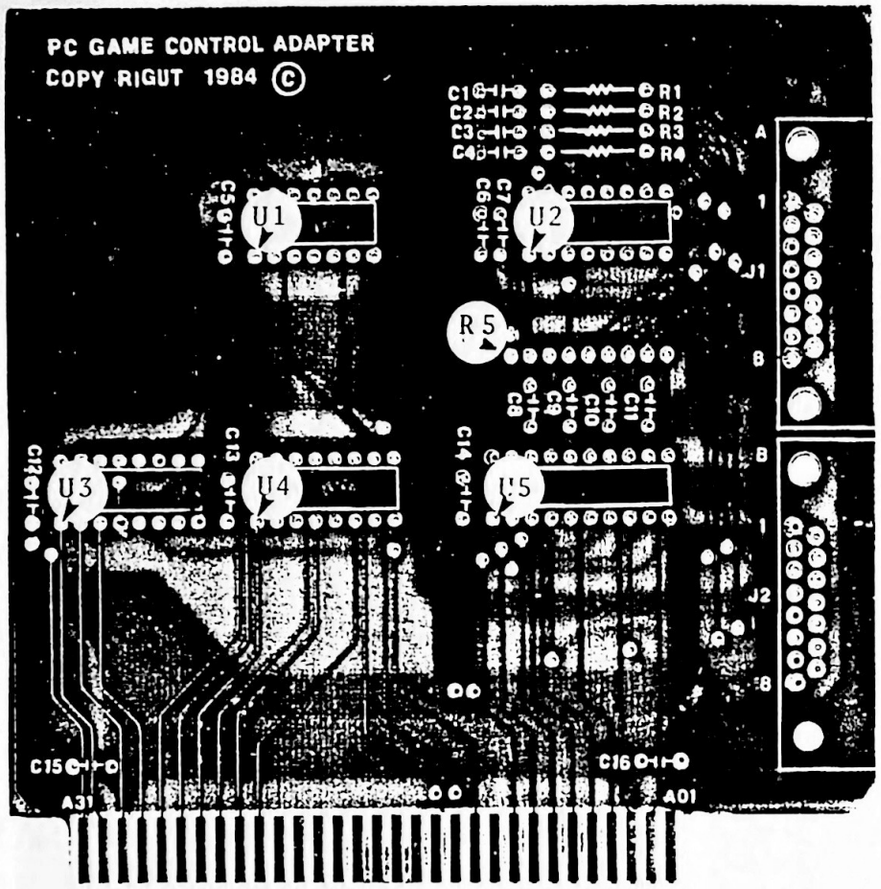
CONNECTORS

____ 2 - DA15S 15-pin female, 90° @ J1,2

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 (arrow) on the layout

____ 1 - 74LS32 @ U4
____ 2 - 74LS138 @ U2,3
____ 1 - 74LS244 @ U5
____ 1 - NE558 @ U1

MPY GAME CONTROL ADAPTER: Provides interface for two joysticks or four paddles. Card fits in short slot.



Actual size is
11.4 cm x 11.1 cm

CAPACITORS C

____ 4 - 47 pF @ C8,9,10,11
____ 6 - 0.01 µF @ C1,2,3,4,6,7
____ 6 - 0.1 µF Monolithic @ C5,12,13, C14,15,16

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS32 @ U1
____ 2 - 74LS138 @ U3,4
____ 1 - 74LS244 @ U5
____ 1 - NE558 @ U2

CONNECTORS

____ 2 - DA15S 15-pin female 90° @ J1,2
____ 1 - rear panel bracket

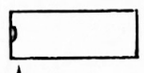
SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

____ 4 - 2.2 KΩ @ R1,2,3,4
____ 1 - 1 KΩ 9-pin SIP* bussed @ R5
*Match pin 1 of SIP with pin 1 on the layout

SOCKETS *Match pin 1 of sockets with pin 1 (square pad) on the layout. Check that ALL pins have passed thru ALL holes

____ 1 - 14-pin
____ 3 - 16-pin
____ 1 - 20-pin



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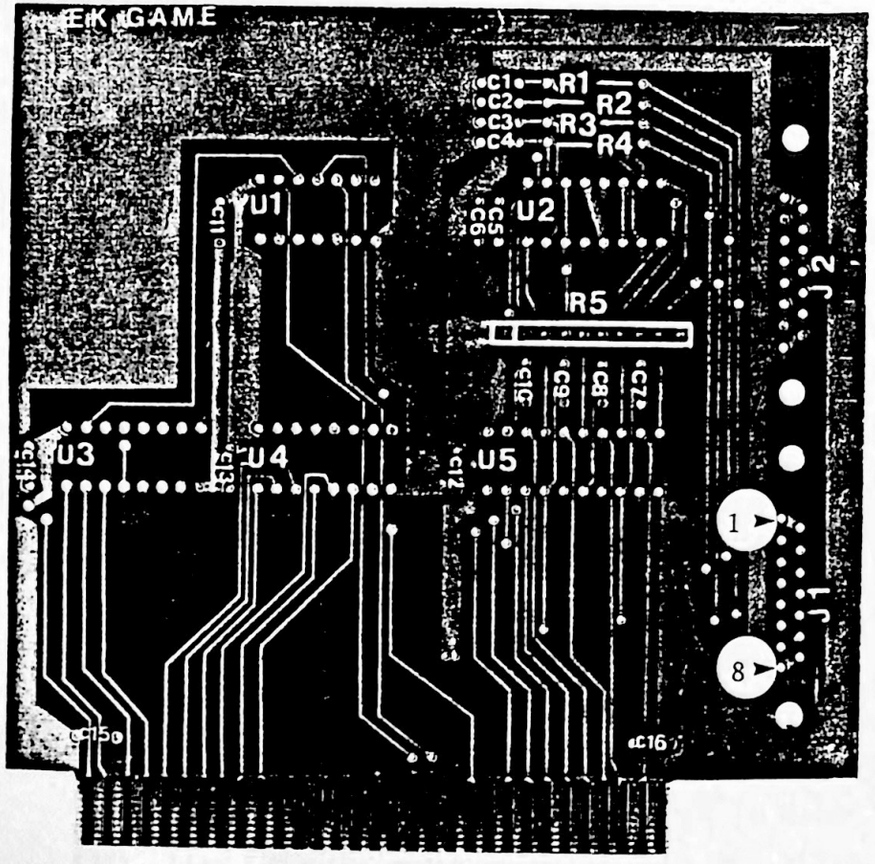
EK GAME CARD: Provides an interface for up to two joysticks or four game paddles. Fits in "short slot".



Actual size is
11.5 cm x 10.9 cm

CAPACITORS C

____ 4 - 47 pF @ C7,8,9,10
____ 6 - 0.01 µF @ C1,2,3,4,5,6
____ 6 - 0.1 µF Monolithic @ C11,12 C13,14,15,16

CONNECTORS

____ 2 - DA15S 15-pin female 90° @J1,2
____ 1 - rear panel bracket

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS32 @ U1
____ 2 - 74LS138 @ U3,4
____ 1 - 74LS244 @ U5
____ 1 - NE558 @ U2

PINOUT

PIN No	SIGNAL
1	+5
2	SW 1
3	PD 1
4	GND
5	GND
6	PD 2
7	SW 2
8	+5
9	+5
10	SW 3
11	PD 3
12	GND
13	PD 4
14	SW 4
15	+5

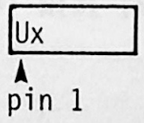
SUGGESTED SEQUENCE *INDICATES A PRECAUTION

RESISTORS R ¼ watt, 5%

____ 4 - 2.2 KΩ @ R1,2,3,4
____ 1 - 4.7 KΩ 10-pin SIP* bussed @ R5
*Match pin 1 of SIP with pin 1 (square) on the layout

SOCKETS *Match pin 1 of sockets with pin 1 (below the U) on the layout. Check that ALL pins have passed thru ALL holes

____ 1 - 14-pin
____ 3 - 16-pin
____ 1 - 20-pin

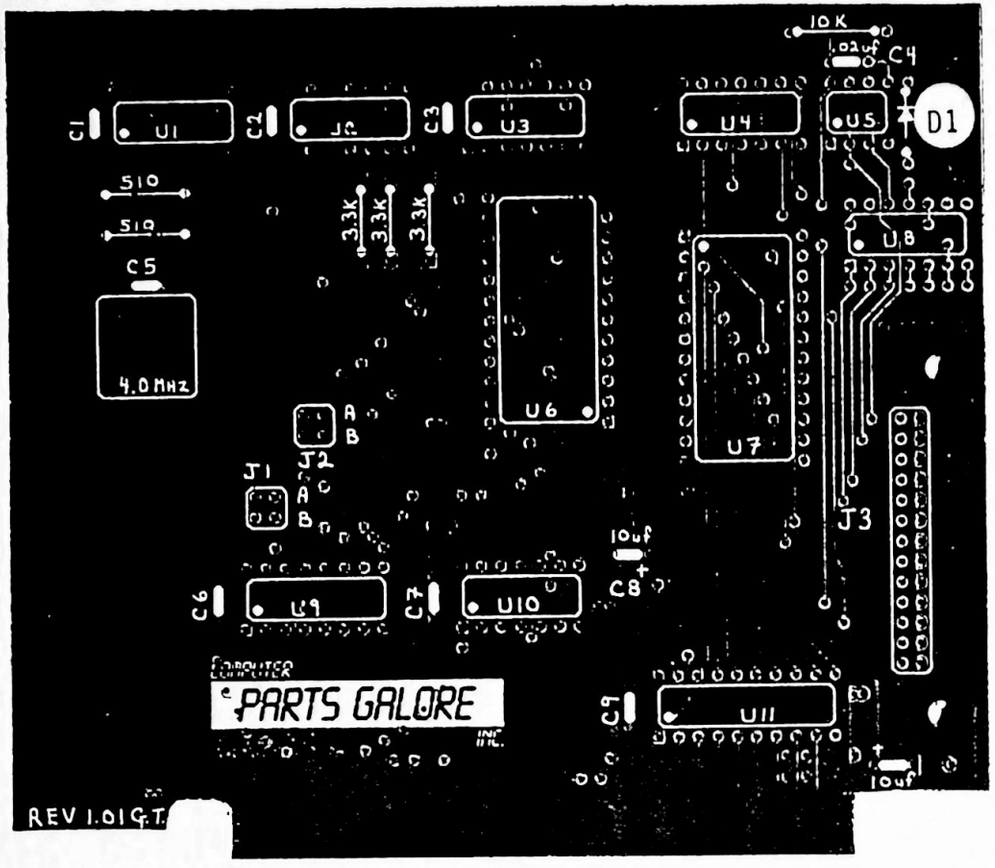


NuScope Associates

MIDI: Allows user to interface synthesizers, drum machines & other MIDI (Musical Instrument Device Interface) equipped musical instruments to the computer. Two-card set with ribbon cable connecting the internal card to the external card. Software required. Documentaion available from supplier.

INTERNAL CARD

Actual size is:
12.7 x 10.6 cm



SUGGESTED SEQUENCE *INDICATES A PRECAUTION

DIODES D *Position banded end (cathode) of diode towards the arrow

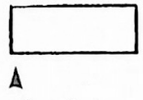
____ 1 - 1N914 @ D1

RESISTORS R ¼ watt,5%

____ 2 - 510 Ω
____ 3 - 3.3 KΩ
____ 1 - 10 KΩ
____ 1 - 150 Ω 14-pin DIP network @ U8

SOCKETS *Match pin 1 of sockets with pin 1 on the layour. Check that ALL pins have passed thru ALL holes

____ 1 - 8-pin
____ 6 - 14-pin
____ 1 - 16-pin
____ 1 - 20-pin
____ 2 - 24-pin



CAPACITORS C

____ 1 - 0.02 µF @ C4
____ 7 - 0.1 µF Monolithic @ C1,2,3, C5,6,7,9
____ 2 - 10 µF/16V Tantalum* @ C8,10 *Match + of Tantalum with + on the layout

CRYSTAL *Fold XTAL flat against the card before soldering. Solder the case to the grounding pad

____ 1 - 4.0000 MHz

CONNECTORS

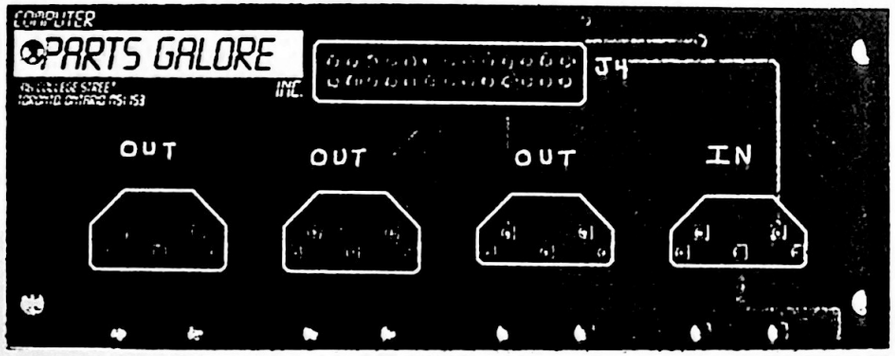
____ 2 - 2x2 header, male, straight @ J1,2
____ 1 - 2x13 header, male, straight @ J3
____ 1 - ribbon cable of appropriate length with one 2x13 female connector at each end (connect J3 to J4)

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U10
____ 1 - 74LS04 @ U1
____ 1 - 74LS93 @ U2
____ 2 - 74LS125 @ U3,4
____ 1 - 74LS245 @ U11
____ 1 - 6N135 @ U5
____ 1 - 6850 @ U7
____ 1 - 8253 @ U6
____ 1 - 24S10 PROM @ U9

MIDI: (continued)

EXTERNAL CARD



Actual size 11.6 x 4.4 cm

____ 1 - 2x13 header, male, straight @ J4
connect with cable to J3

____ 4 - 5-pin DIN Keyboard connector
PCB mount @ OUT and IN

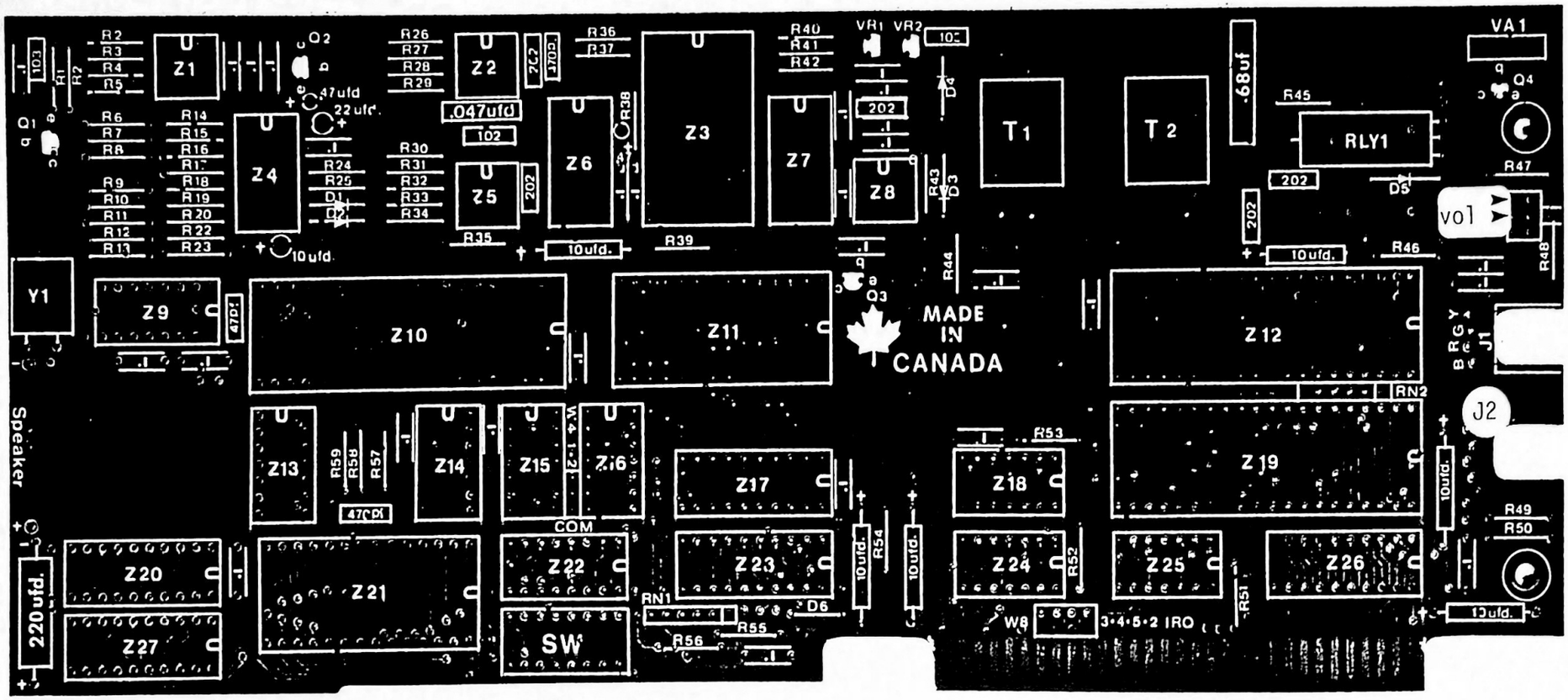
INSTALL SHORTING PLUGS ACROSS THE FOLLOWING:
A of J1 = interupt 5 selected
B of J1 = interupt 4 selected
A of J2 = timer #2 selected for interupt
B of J2 = timer #Ø clocking timer #1
with timer #1 selected for
interupt

8253 ADDRESSES:
$3EØ read counter #1
$3EØ load counter #1
$3E1 read counter #2
$3E1 load counter #2
$3E2 read counter #3
$3E2 load counter #3
$3E3 write mode word same
for all counters

6850 ADDRESSES:
$3E9 write transmit register
$3E9 read recieve register
$3E8 write acia control register
$3E8 read acia status

24S10 PROM MEMORY LOACATIONS:
$7C = $6
$7D = $5
$F all other locations

PRELUDE 1200B MODEM: Hayes compatible 1200/300 baud modem featuring: direct connect, half or full duplex, auto answer & dial, auto speed select, pulse or touch-tone dialing, speaker on board. Requires firmware (two EPROMs) and software.



SUGGESTED SEQUENCE *INDICATES A PRECAUTION Actual size is 25.4 x 10.7 cm

DIODES D *Position banded (cathode) end of diode towards the arrow

____ 4 - 1N4731 @ D1,2,3,4
____ 2 - 1N914 @ D5,6

RESISTORS R *Note TWO R2s; R21 NOT shown ¼ watt 5%

____ 1 - 15 Ω @ R43
____ 1 - 36 Ω @ R59
____ 1 - 47 Ω @ R51
____ 2 - 560 Ω @ R57,58
____ 1 - 750 Ω @ R3
____ 2 - 1 KΩ @ R33,38
____ 1 - 1.5 KΩ @ R29
____ 5 - 2.2 KΩ @ R13,23,26,28,37
____ 1 - 4.7 KΩ @ R47
____ 1 - 5.1 KΩ @ R54
____ 2 - 6.8 KΩ @ R24,40

RESISTORS (continued) ¼ watt, 5%

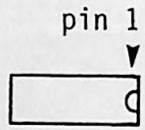
____ 2 - 8.2 K @ R39,46
____ 14 - 10 KΩ @ R5,16,17,19,22,35,36 R44,48,49,50,52,55,56
____ 1 - 15 KΩ @ R18
____ 1 - 30 KΩ @ R25
____ 3 - 68 KΩ @ R12,41,45
____ 3 - 100 KΩ @ R1,42,53

PRELUDE 1200B MODEM (continued)

RESISTORS ¼ watt, 5% (continued)
____ 2 - 220 KΩ @ R20,27
____ 3 - 300 KΩ @ R2*,2*,4

RESISTORS ¼ watt, 1%
____ 2 - 82.5 Ω @ R6,7
____ 2 - 604 Ω @ R10,30
____ 2 - 2.05 KΩ @ R14,15
____ 6 - 22.1 KΩ @ R8,9,11,31,32,34
____ 2 - 10 KΩ 6-pin SIP* bussed
* RN1,2 *Match pin 1 of SIP with pin 1 on layout

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes
____ 4 - 8-pin
____ 8 - 14-pin
____ 4 - 16-pin
____ 5 - 20-pin
____ 1 - 24-pin
____ 2 - 28-pin
____ 3 - 40-pin



CAPACITORS C
____ 1 - 47 pF @ 47pf
____ 2 - 470 pF @ 470pf
____ 1 - 0.001 µF @ 102
____ 5 - 0.0022 µF @ 202
____ 2 - 0.01 µF @ 103
____ 26 - 0.1 µF Monolithic @ .1
*Match + of the following 16V electrolytic capacitors with + on the layout
____ 2 - 0.47 µF Tantalum* @ .47 ufd.
____ 6 - 10 µF Axial* @ 10 ufd.
____ 1 - 10 µF Tantalum* @ 10 ufd.
____ 1 - 22 µF Tantalum* @ 22 ufd.
____ 1 - 220 µF Axial* @ 220 ufd.
____ 1 - 0.047 µF Polystyrene @ .047 ufd.
____ 1 - 0.68 µF Polystyrene @ .68 ufd.

CRYSTAL Y *Fold crystal flat against the card before soldering. Solder the case to the grounding pad
____ 1 - 11.05920 MHz @ Y1

SWITCH
____ 1 - 8-position DIP @ SW

TRANISTORS Q
____ 2 - 2N2222A @ Q1,3
____ 1 - 2N3904 @ Q4
____ 1 - 2N4091 @ Q2

VOLTAGE REGULATORS
____ 1 - 78L05 +5V TO92 pkge @ VR2
____ 1 - 79L05 -5V TO92 pkge @ VR1

CONNECTORS
____ 1 - 1x3 header, male, straight @ W4
____ 1 - 2x4 header, male, straight @ W8
____ 1 - rear panel adapter
____ - - jumper pins

MISCELLANEOUS
____ 1 - Reed Relay, Standex L-10748 BZ @ RLY1
____ 1 - 180V or 250V Varistor @ VA1
____ 2 - Transformers 1:1 600 Ω impedence line-metching @ T1, T2
____ 1 - Modular telephone jack, 6-pin PCB-mount @ J1 (J2 optional) *Match wire colors with B=black, R=red, G=green, Y=yellow
_____ 1 - Speaker, small, 8 Ω. Secure speaker to card with two-way tape and solder the leads to + & - on card

INTEGRATED CIRCUITS * Match pin pin 1 of ICs with pin 1 on layout
____ 1 - 74LS00 @ Z15
____ 2 - 74LS04 @ Z13,16
____ 1 - 74LS10 @ Z18
____ 1 - 74LS30 @ Z24
____ 1 - 74LS125 @ Z25
____ 1 - 74LS245 @ Z26
____ 1 - 74LS363 @ Z22
____ 1 - 74LS373 @ Z17,20
____ 1 - 7492 @ Z14
____ 1 - LM386 @ Z8
____ 1 - 1408P6 @ Z9
____ 3 - 1458 @ Z1,2,5
____ 2 - 14053 @ Z6,7
____ 2 - 74HC374 @ Z23,27
____ 1 - µA339 @ Z4
____ 2 - 8031 @ Z10,12
____ 1 - 8250 @ Z19
____ 1 - S35212 @ Z3 Modem IC
____ 2 - 1764 EPROM 250 ns @ Z11,21

MISCELLANEOUS (continued)
____ 1 - Volume control @ vol or strap pins 1-2

COM PORT SELECT @ W4 & W8 (IRQ):

	COM 1	COM 2	COM 3
W4	strap 2	strap 1	strap 1
W8	strap 4	strap 3	strap 2

SWITCH SETTINGS @ SW *Indicates DEFAULT settings **Turn power off when setting switches

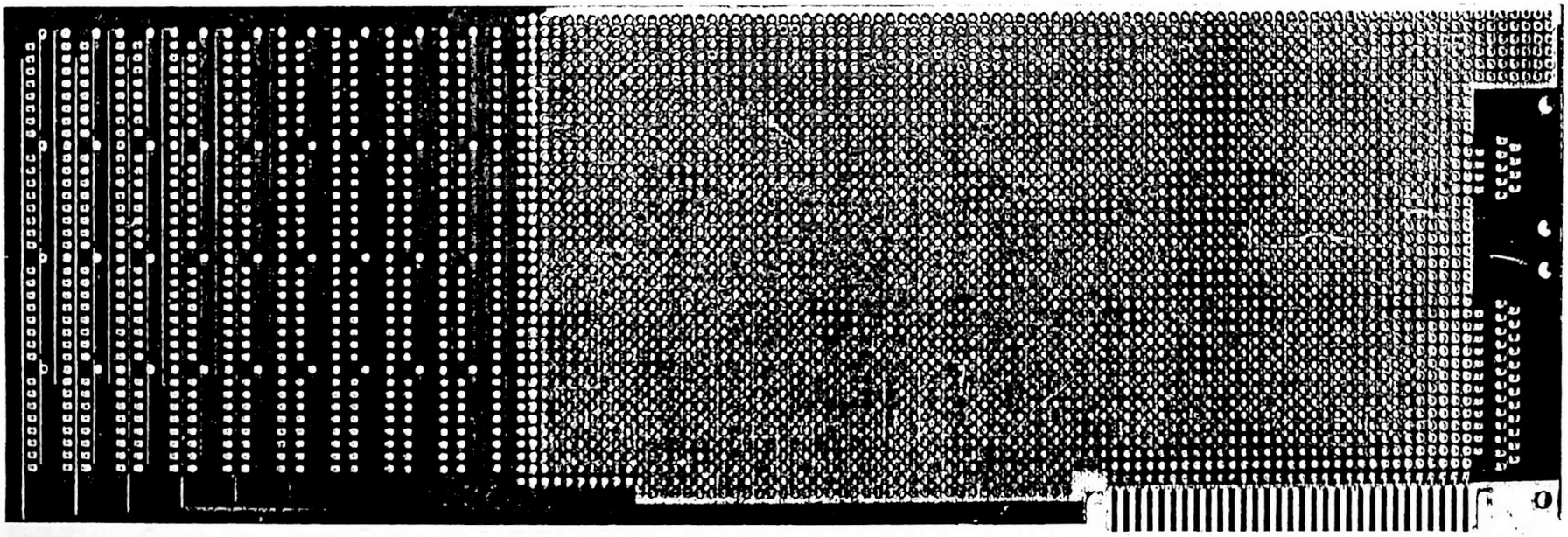
SW #	1 result codes	2 command recognition	3 phone setting	4 auto answer	5 codes to screen	6 carrier detect	7 auto redial	8 COM port
ON	*Hayes	*enable	*single	*disable	*yes	forces	*disable	*COM 2,3
OFF	card	disable	multiple	enable	no	*normal	enable	COM 1

DATAMAX-001: Allows user to design prototype hardware. Approximately 4600 holes (10 holes per inch on 0.1 inch centres) for wire-wrap or solder-tail sockets. Two bus lines, one connected to ground, are present on each side.

SIDE B		A SIDE	
GND	1	1	$\overline{\text{I/OCHK}}$
RESET	2	2	D7
+5V	3	3	D6
IRQ2	4	4	D5
-5V	5	5	D4
DRQ2	6	6	D3
-12V	7	7	D2
NC	8	8	D1
+12V	9	9	DØ
GND	10	10	I/OCHRDY
$\overline{\text{MEMW}}$	11	11	AEN
$\overline{\text{MEMR}}$	12	12	A19
$\overline{\text{IOW}}$	13	13	A18
$\overline{\text{IOR}}$	14	14	A17
$\overline{\text{DACK3}}$	15	15	A16
DRQ3	16	16	A15
$\overline{\text{DACK1}}$	17	17	A14
DRQ1	18	18	A13
$\overline{\text{DACKØ}}$	19	19	A12
CLK	20	20	A11
IRQ7	21	21	A1Ø
IRQ6	22	22	A9
IRQ5	23	23	A8
IRQ4	24	24	A7
IRQ3	25	25	A6
$\overline{\text{DACK2}}$	26	26	A5
T/C	27	27	A4
ALE	28	28	A3
+5V	29	29	A2
OSC	30	30	A1
GND	31	31	AØ

NuScope Associates

MEMORY PROTOTYPE CARD: Prototype card with 256 K or 1 M bytes of memory layout using 4164 or 256 K RAM chips, respectively. Extensive wire-wrap area - approximately 2700 holes, 10 holes per inch, on 0.1 inch centres. DE9 and DB25 footprinters are present on card for I/O.



A31 A1

SIDE B		A SIDE	
GND	1	1	$\overline{\text{I/OCHK}}$
RESET	2	2	D7
+5V	3	3	D6
IRQ2	4	4	D5
-5V	5	5	D4
DRQ2	6	6	D3
-12V	7	7	D2
NC	8	8	D1
+12V	9	9	DØ
GND	10	10	I/OCHRDY
$\overline{\text{MEMW}}$	11	11	AEN
$\overline{\text{MEMR}}$	12	12	A19
$\overline{\text{IOW}}$	13	13	A18
$\overline{\text{IOR}}$	14	14	A17
$\overline{\text{DACK3}}$	15	15	A16
DRQ3	16	16	A15
$\overline{\text{DACK1}}$	17	17	A14
DRQ1	18	18	A13
$\overline{\text{DACKØ}}$	19	19	A12
CLK	20	20	A11
IRQ7	21	21	A1Ø
IRQ6	22	22	A9
IRQ5	23	23	A8
IRQ4	24	24	A7
IRQ3	25	25	A6
$\overline{\text{DACK2}}$	26	26	A5
T/C	27	27	A4
ALE	28	28	A3
+5V	29	29	A2
OSC	30	30	A1
GND	31	31	AØ

NuScope Associates

PROTOPLUS PROTOTYPE CARD: Allows user to design prototype hardware. Completely covered with holes (approximately 4800 holes, 10 holes per inch, 0.1 inch spacing) for wire-wrap and solder-tail sockets.

SIDE B		A SIDE	
GND	1	1	$\overline{\text{I/OCHK}}$
RESET	2	2	D7
+5V	3	3	D6
IRQ2	4	4	D5
-5V	5	5	D4
DRQ2	6	6	D3
-12V	7	7	D2
NC	8	8	D1
+12V	9	9	DØ
GND	10	10	I/OCHRDY
$\overline{\text{MEMW}}$	11	11	AEN
$\overline{\text{MEMR}}$	12	12	A19
$\overline{\text{IOW}}$	13	13	A18
$\overline{\text{IOR}}$	14	14	A17
$\overline{\text{DACK3}}$	15	15	A16
DRQ3	16	16	A15
$\overline{\text{DACK1}}$	17	17	A14
DRQ1	18	18	A13
$\overline{\text{DACKØ}}$	19	19	A12
CLK	20	20	A11
IRQ7	21	21	A1Ø
IRQ6	22	22	A9
IRQ5	23	23	A8
IRQ4	24	24	A7
IRQ3	25	25	A6
$\overline{\text{DACK2}}$	26	26	A5
T/C	27	27	A4
ALE	28	28	A3
+5V	29	29	A2
OSC	30	30	A1
GND	31	31	AØ

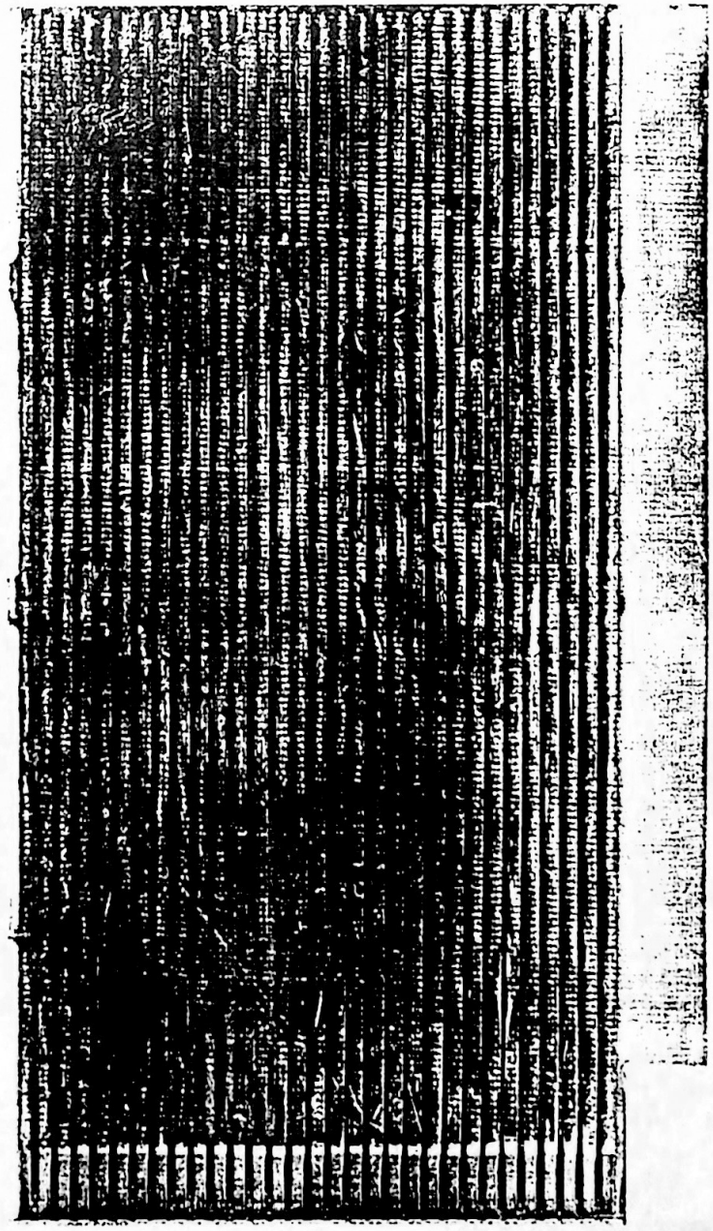
NuScope Associates

EXTENDER BOARD: Lifts card 15 cm above the motherboard for easy testing and servicing.

Secure a 62-pin card edge connector to the top of the EXTENDER BOARD so that the pins of the connector line up with the traces on the BOARD. Centre the connector and solder the end pins to the BOARD. Check that the pins are lined up and solder the remaining pins to the BOARD. Appropriately label one end of the connector "A1" and "B1".

SIDE B		A SIDE
GND	1	1 I/OCHK
RESET	2	2 D7
+5V	3	3 D6
IRQ2	4	4 D5
-5V	5	5 D4
DRQ2	6	6 D3
-12V	7	7 D2
NC	8	8 D1
+12V	9	9 D0
GND	10	10 I/OCHRDY
MEMW	11	11 AEN
MEMR	12	12 A19
IOW	13	13 A18
IOR	14	14 A17
DACK3	15	15 A16
DRQ3	16	16 A15
DACK1	17	17 A14
DRQ1	18	18 A13
DACK0	19	19 A12
CLK	20	20 A11
IRQ7	21	21 A10
IRQ6	22	22 A9
IRQ5	23	23 A8
IRQ4	24	24 A7
IRQ3	25	25 A6
DACK2	26	26 A5
T/C	27	27 A4
ALE	28	28 A3
+5V	29	29 A2
OSC	30	30 A1
GND	31	31 A0

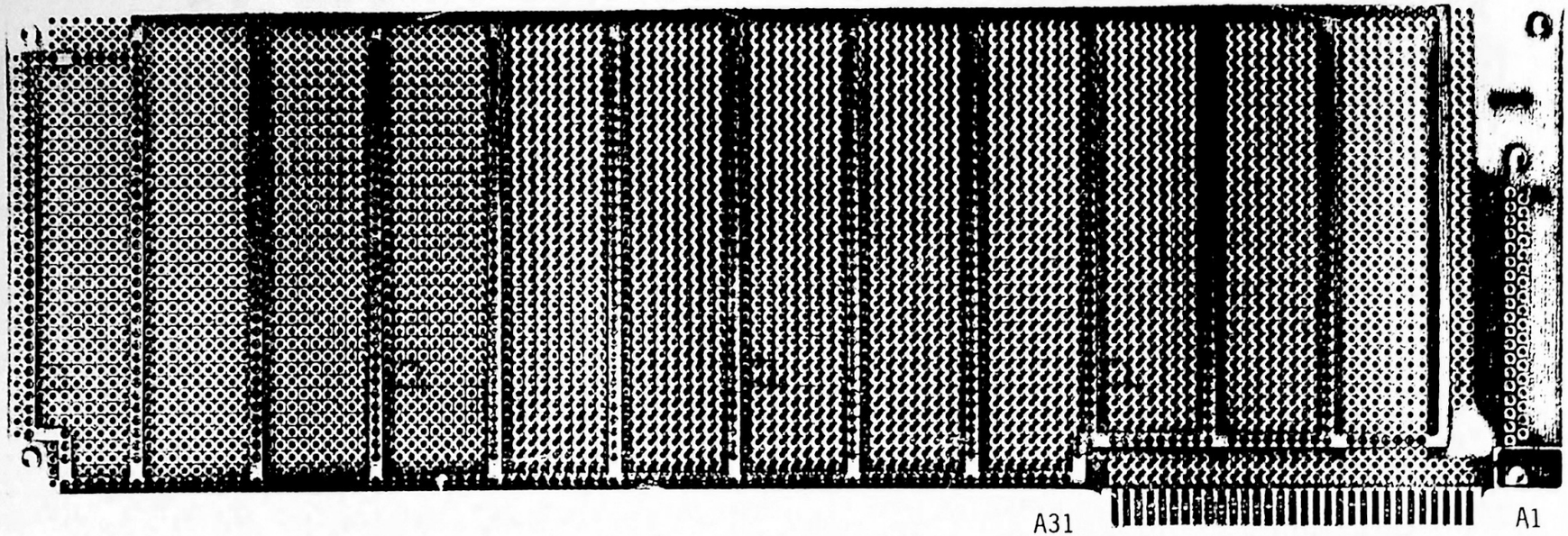
SOLDER CARD EDGE CONNECTOR
TO
TOP OF BOARD



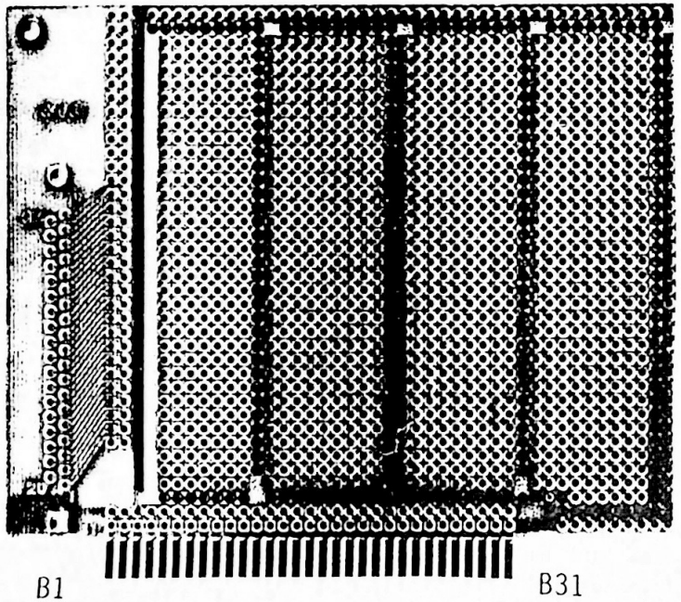
gold fingers

CONNECT TO MOTHERBOARD

PERFECT PROTOTYPE CARD: Allows user to design prototype hardware. Contains approximately 4,500 holes, 10 holes per inch (0.1 inch spacing). Bus line on solder side connects to +5V. A DC37 footprint is located on the solder side.



A31 A1

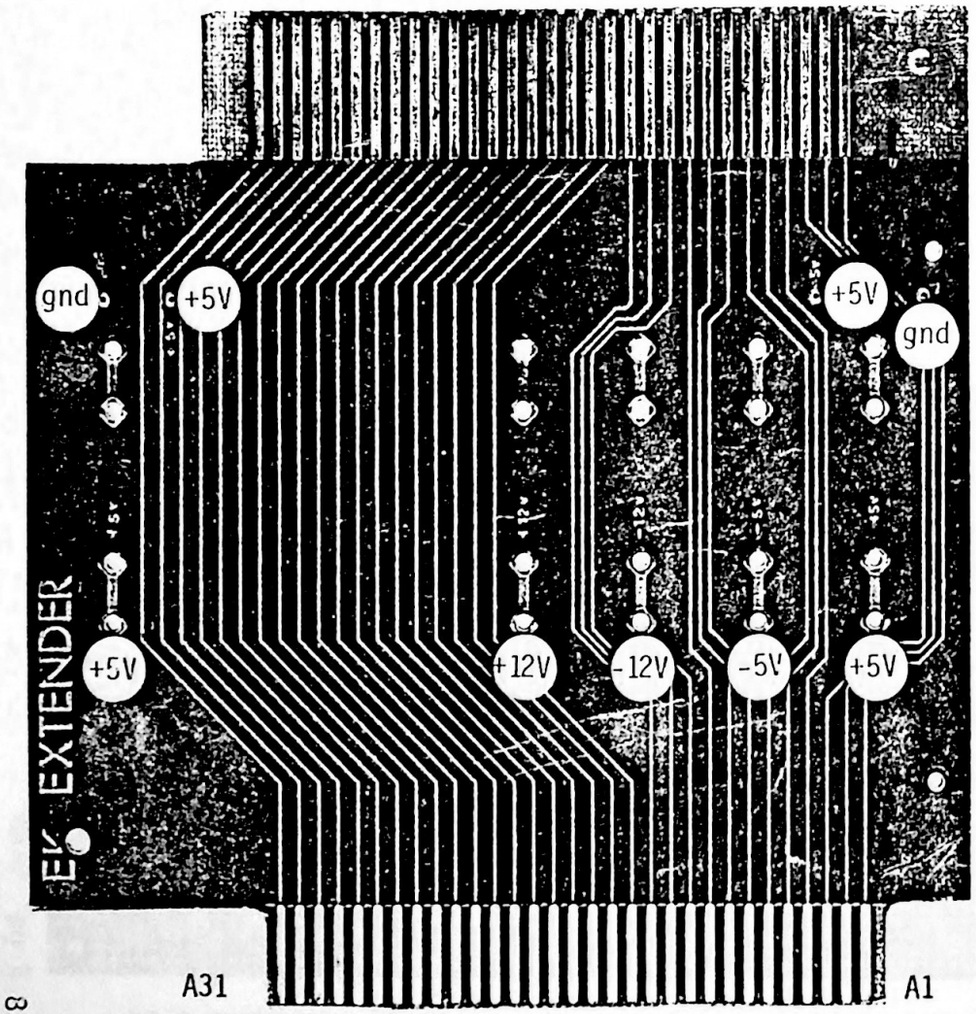


B1 B31

SIDE B		A SIDE	
GND	1	I/OCHK	1
RESET	2	D7	2
+5V	3	D6	3
IRQ2	4	D5	4
-5V	5	D4	5
DRQ2	6	D3	6
-12V	7	D2	7
NC	8	D1	8
+12V	9	DØ	9
GND	10	I/OCHRDY	10
MEMW	11	AEN	11
MEMR	12	A19	12
IOW	13	A18	13
IOR	14	A17	14
DACK3	15	A16	15
DRQ3	16	A15	16
DACK1	17	A14	17
DRQ1	18	A13	18
DACKØ	19	A12	19
CLK	20	A11	20
IRQ7	21	A1Ø	21
IRQ6	22	A9	22
IRQ5	23	A8	23
IRQ4	24	A7	24
IRQ3	25	A6	25
DACK2	26	A5	26
T/C	27	A4	27
ALE	28	A3	28
+5V	29	A2	29
OSC	30	A1	30
GND	31	AØ	31

EK FUSIBLE EXTENDER CARD: Lifts peripheral card approx 12 cm above the motherboard for ease of trouble-shooting and servicing. Add fuses to the ±5 and the ±12V lines for circuit protection while trouble-shooting or testing.

SOLDER CARD EDGE CONNECTOR
TO TOP OF CARD



INSTALL IN ANY SLOT

SUGGESTED SEQUENCE

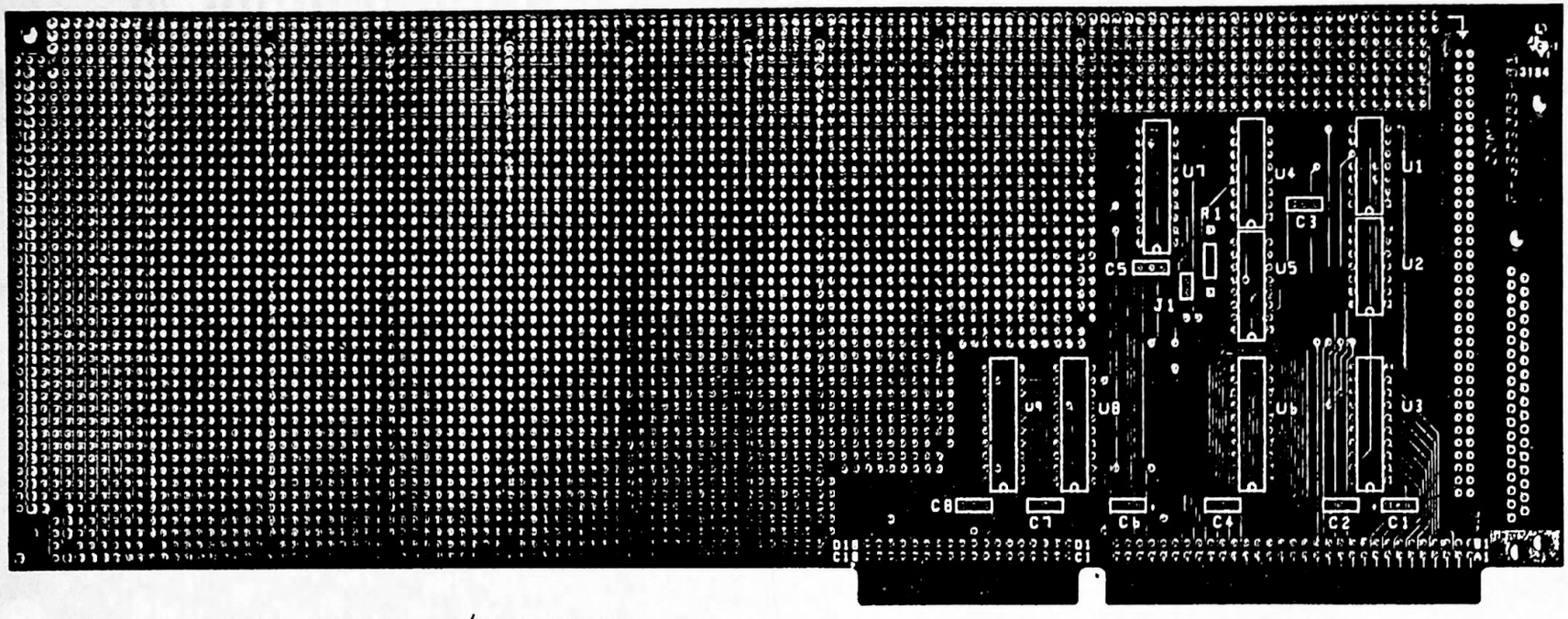
1 - 62-pin card edge connector Secure the connector to the top of the EXTENDER CARD so that the pins of the connector line up with the traces on the CARD. Center the connector and solder the end pins to the CARD. Check that the pins are lined up and solder the remaining pins to the CARD. Appropriately label one end of the connector "A1" and "B1".

10- fuse clips
4 - headers, male, straight as test points
10- fuses of appropriate size

SIDE B		A SIDE	
GND	1	1	I/OCHK
RESET	2	2	D7
+5V	3	3	D6
IRQ2	4	4	D5
-5V	5	5	D4
DRQ2	6	6	D3
-12V	7	7	D2
NC	8	8	D1
+12V	9	9	D0
GND	10	10	I/OCHRDY
MEMW	11	11	AEN
MEMR	12	12	A19
IOW	13	13	A18
IOR	14	14	A17
DACK3	15	15	A16
DRQ3	16	16	A15
DACK1	17	17	A14
DRQ1	18	18	A13
DACK0	19	19	A12
CLK	20	20	A11
IRQ7	21	21	A10
IRQ6	22	22	A9
IRQ5	23	23	A8
IRQ4	24	24	A7
IRQ3	25	25	A6
DACK2	26	26	A5
T/C	27	27	A4
ALE	28	28	A3
+5V	29	29	A2
OSC	30	30	A1
GND	31	31	A0

NuScope Associates

AT PROTOTYPE ADAPTER: Features wire-wrap area with over 4300 holes on 0.1" centers; 37 plated-trhu holes for 9-37 position D-shell. Component side has 0.05" wide ground bus line and is silk-screening that may be used as a component guide for I/O interface. Solder side has 0.05" 5V bus line.



Layout is reduced
Actual size is 33.3 x 12.1 cm

SUGGESTED COMPONENT GUIDE FOR I/O INTERFACE

RESISTORS R ¼ watt, 5%

____ 1 - 10 KΩ @ R1

SOCKETS *Match pin 1 of sockets with pin 1 on the layout. Check that ALL pins have passed thru ALL holes

____ 2 - 14-pin
____ 2 - 16-pin
____ 5 - 20-pin

CAPACITORS C

____ 6 - 0.045 µF @ C2,3,4,5,7,8
____ 2 - 10 µF/16V Tantalum* @ C1,6
*Note polarity

HEADER

____ 1 - 1x2 male, straight @ J1

*J1, U8,9 are NOT required for low-order 8-bits of data bus

INTEGRATED CIRCUITS *Match pin 1 of ICs with pin 1 on the layout

____ 1 - 74LS00 @ U1
____ 1 - 74LS10 @ U2
____ 1 - 74LS138 @ U5
____ 1 - 74LS139 @ U4
____ 3 - 74LS244 @ U6,7,8*
____ 1 - 74LS245 @ U9*,3

NuScope Associates

AT PROTOTYPE ADAPTER (continued)

EDGE CARD CONNECTORS PINOUT

SOLDER SIDE B		COMPONENT A SIDE
GND	1	1 $\overline{\text{I/OCHK}}$
RESET	2	2 D7
+5V	3	3 D6
IRQ2	4	4 D5
-5V	5	5 D4
DRQ2	6	6 D3
-12V	7	7 D2
NC	8	8 D1
+12V	9	9 DØ
GND	10	10 I/OCHRDY
$\overline{\text{MEMW}}$	11	11 AEN
$\overline{\text{MEMR}}$	12	12 A19
$\overline{\text{IOW}}$	13	13 A18
$\overline{\text{IOR}}$	14	14 A17
$\overline{\text{DACK3}}$	15	15 A16
DRQ3	16	16 A15
$\overline{\text{DACK1}}$	17	17 A14
DRQ1	18	18 A13
$\overline{\text{DACKØ}}$	19	19 A12
CLK	20	20 A11
IRQ7	21	21 AlØ
IRQ6	22	22 A9
IRQ5	23	23 A8
IRQ4	24	24 A7
IRQ3	25	25 A6
$\overline{\text{DACK2}}$	26	26 A5
T/C	27	27 A4
ALE	28	28 A3
+5V	29	29 A2
OSC	30	30 A1
GND	31	31 AØ

SOLDER SIDE D		COMPONENT C SIDE
-MEM CS16	1	1 -SBHE
-I/O CS16	2	2 +LA A23
+IRQ 10	3	3 +LA A22
+IRQ 11	4	4 +LA A21
+IRQ 12	5	5 +LA A20
+IRQ 13	6	6 +LA A19
+IRQ 14	7	7 +LA A18
-DACK 4	8	8 +LA A17
+DRQ 4	9	9 -MEMR
-DACK 5	10	10 -MEMW
+DRQ 5	11	11 +D8
-DACK 6	12	12 +D9
+DRQ 6	13	13 +D10
-DACK 7	14	14 +D11
+DRQ 7	15	15 +D12
+5VDC	16	16 +D13
-MASTER	17	17 +D14
GROUND	18	18 +D15